

EXHIBIT A

(12) United States Patent
Copeland et al.(10) Patent No.: US 6,827,901 B2
(45) Date of Patent: Dec. 7, 2004

(54) AUTOMATED BIOLOGICAL REACTION APPARATUS

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(21) Appl. No.: 10/137,169

(22) Filed: May 2, 2002

(65) Prior Publication Data

US 2002/0114733 A1 Aug. 22, 2002

Related U.S. Application Data

(63) Continuation of application No. 09/931,513, filed on Aug. 16, 2001, which is a continuation of application No. 09/452,309, filed on Dec. 1, 1999, now Pat. No. 6,352,861, which is a continuation of application No. 08/906,678, filed on Aug. 5, 1997, now abandoned, which is a continuation of application No. 08/479,415, filed on Jun. 6, 1995, now Pat. No. 5,654,200, which is a division of application No. 08/352,966, filed on Dec. 9, 1994, now Pat. No. 5,595,707, which is a continuation of application No. 07/924,052, filed on Aug. 31, 1992, now abandoned, which is a continuation-in-part of application No. 07/488,601, filed on Mar. 2, 1990, now abandoned.

(51) Int. Cl.⁷ G01N 35/00

(52) U.S. Cl. 422/64; 422/62; 422/67; 436/43; 436/45; 436/46; 436/54; 436/55

(58) Field of Search 436/43, 45, 46, 436/48, 49, 54-55; 422/62, 64, 67

(56)

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Primary Examiner—Lyle A. Alexander

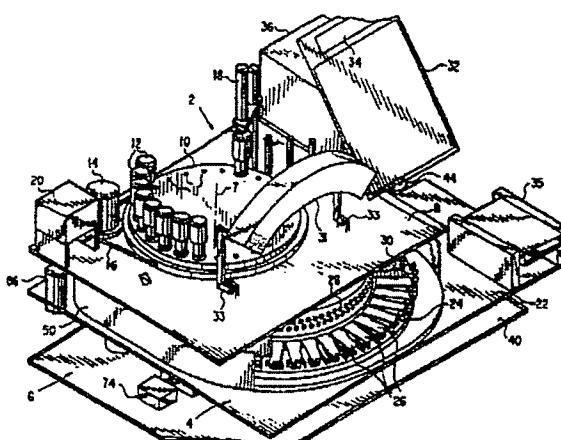
(74) Attorney, Agent, or Firm—McDonnell Bochne Hulbert & Berghoff LLP

(57)

ABSTRACT

An automated immunostaining apparatus having a reagent application zone and a reagent supply zone. The apparatus has a carousel slide support supporting a plurality of slide supports thereon, and drive means engaging the carousel slide support for consecutively positioning each of a plurality of slide supports in the reagent application zone. The apparatus also has a carousel reagent support having a plurality of reagent container supports thereon, and drive means engaging the carousel for rotating the carousel and positioning a preselected reagent container support in the reagent supply zone. The apparatus also has a reagent delivery actuator means positioned for engaging a reagent container positioned on a container support.

45 Claims, 37 Drawing Sheets



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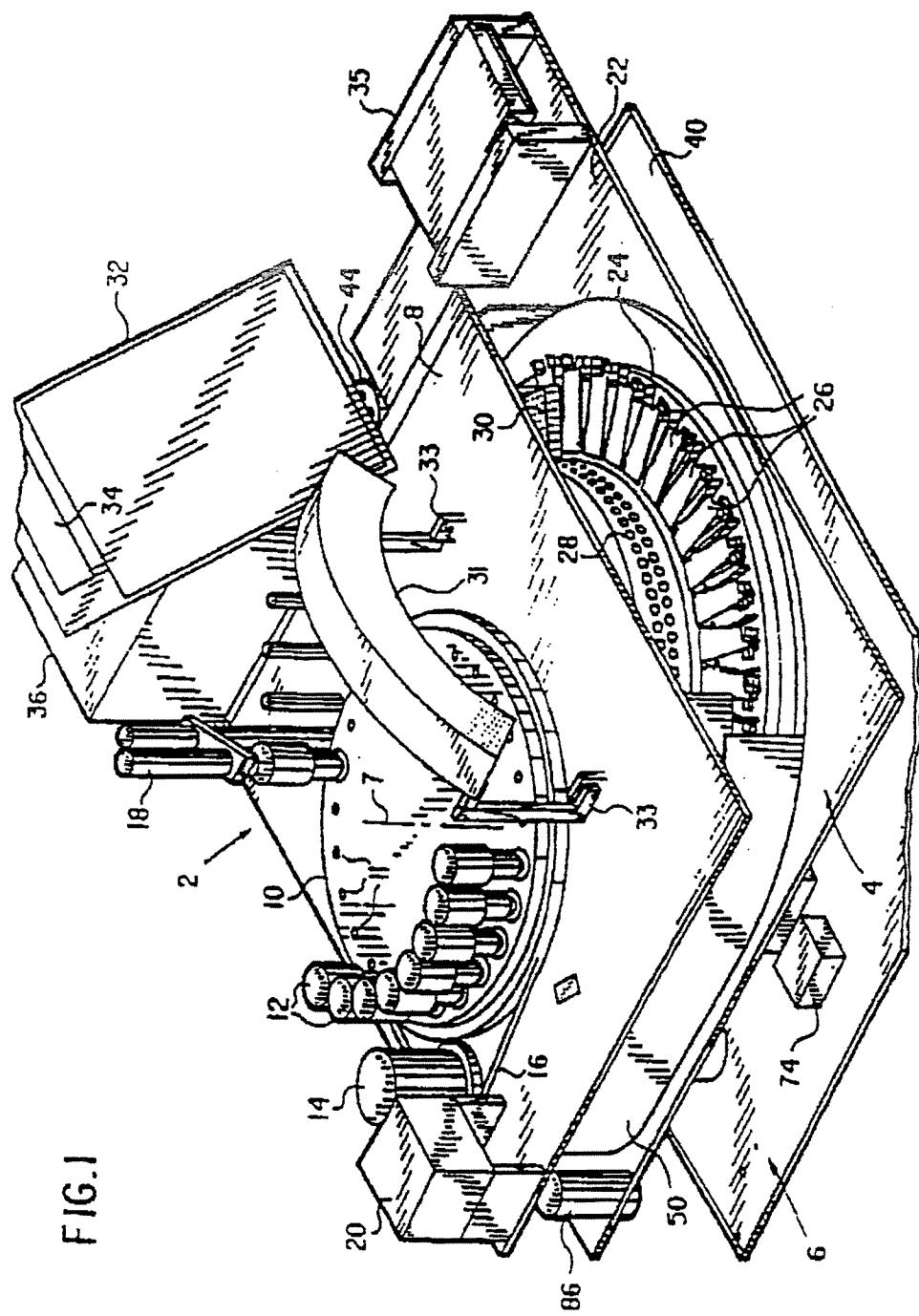


FIG. 1

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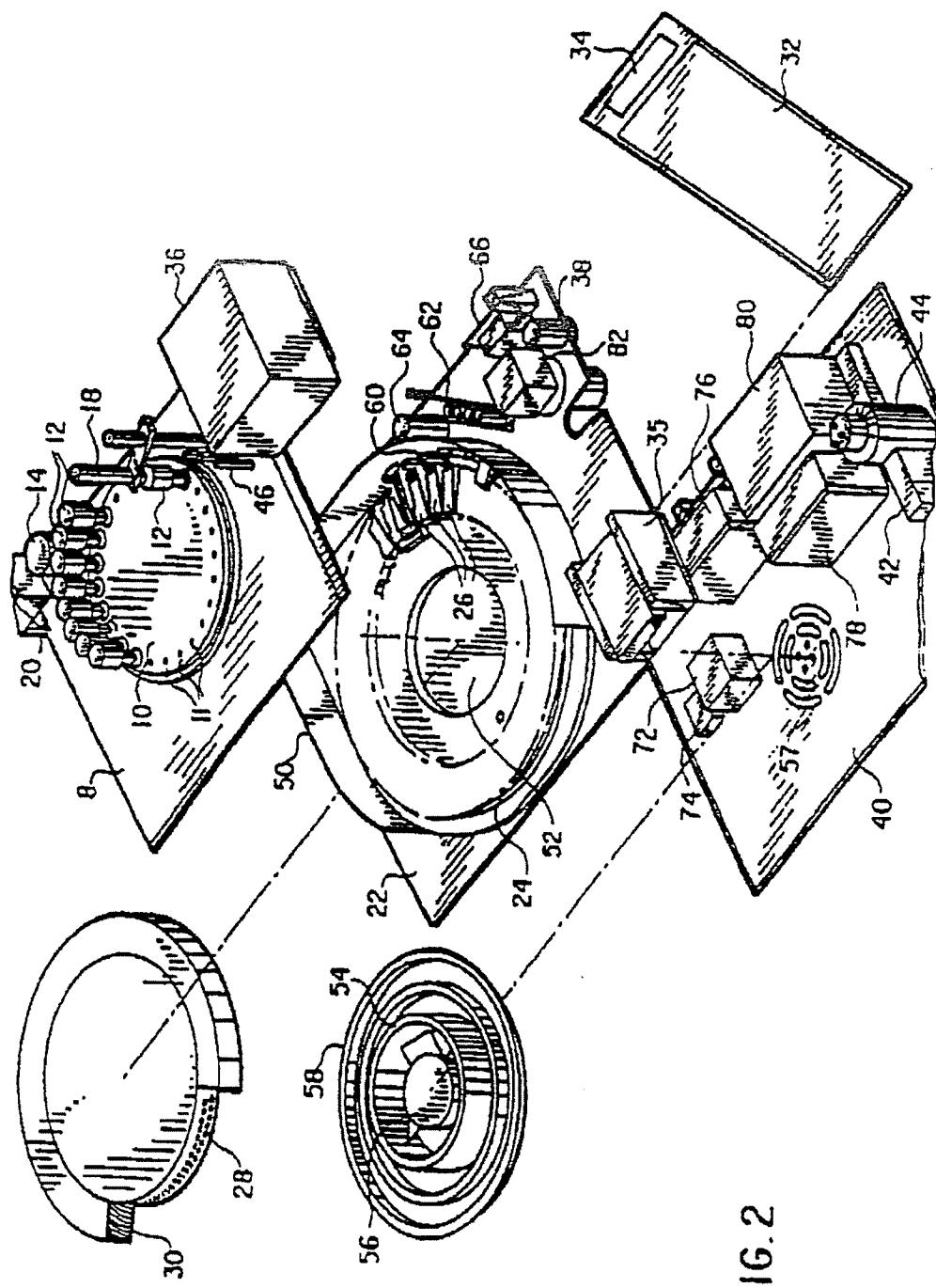


FIG.3

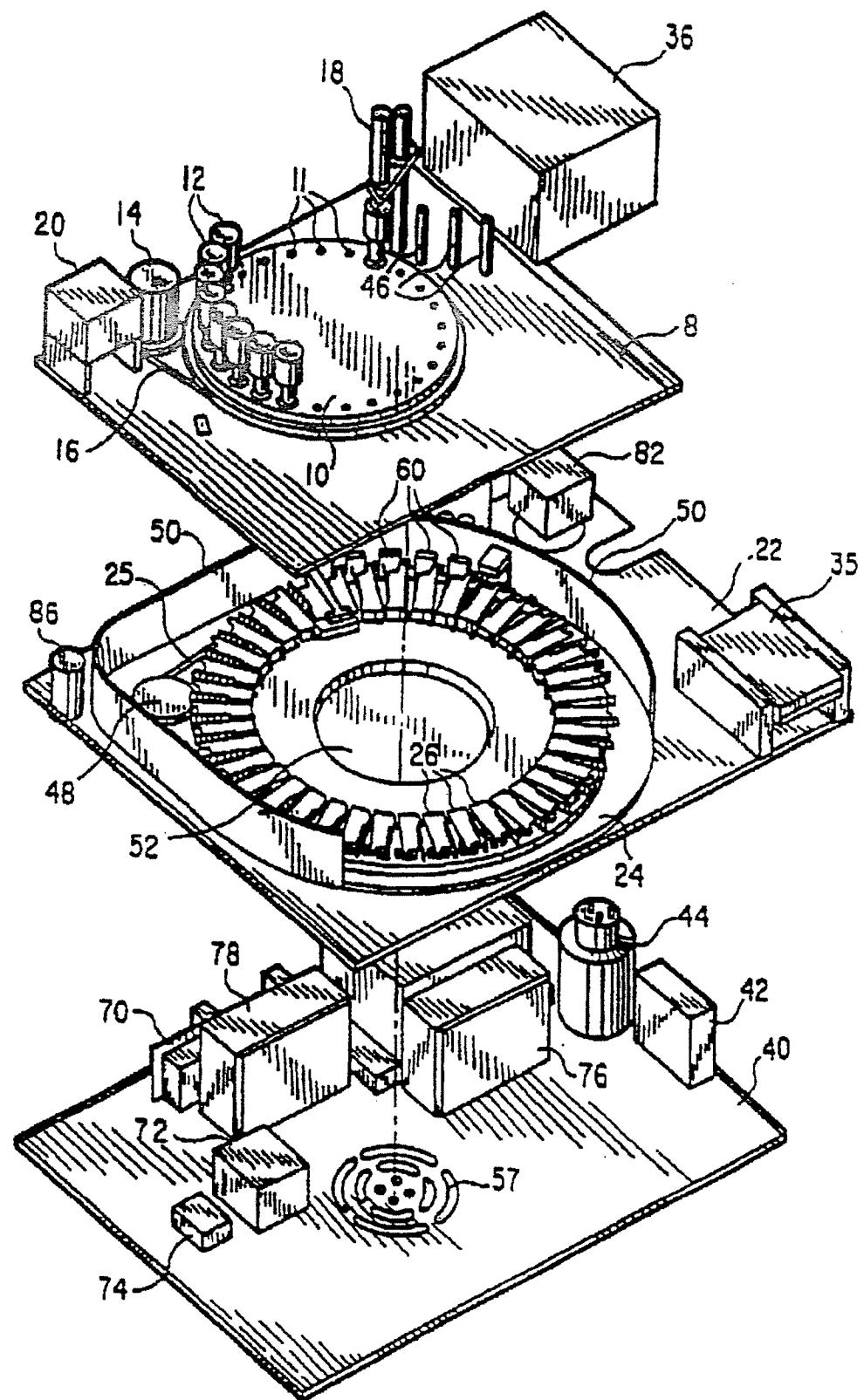
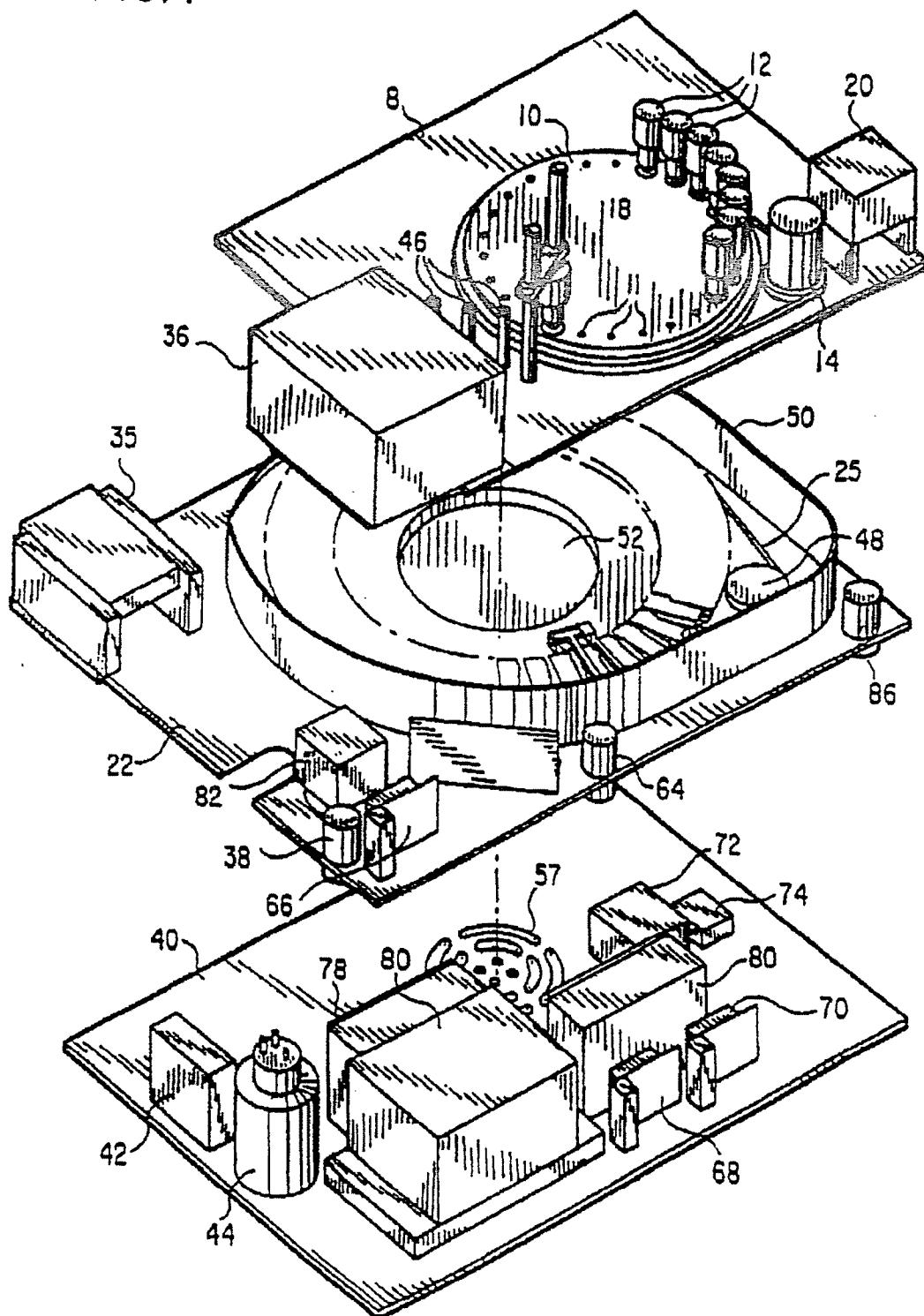


FIG. 4



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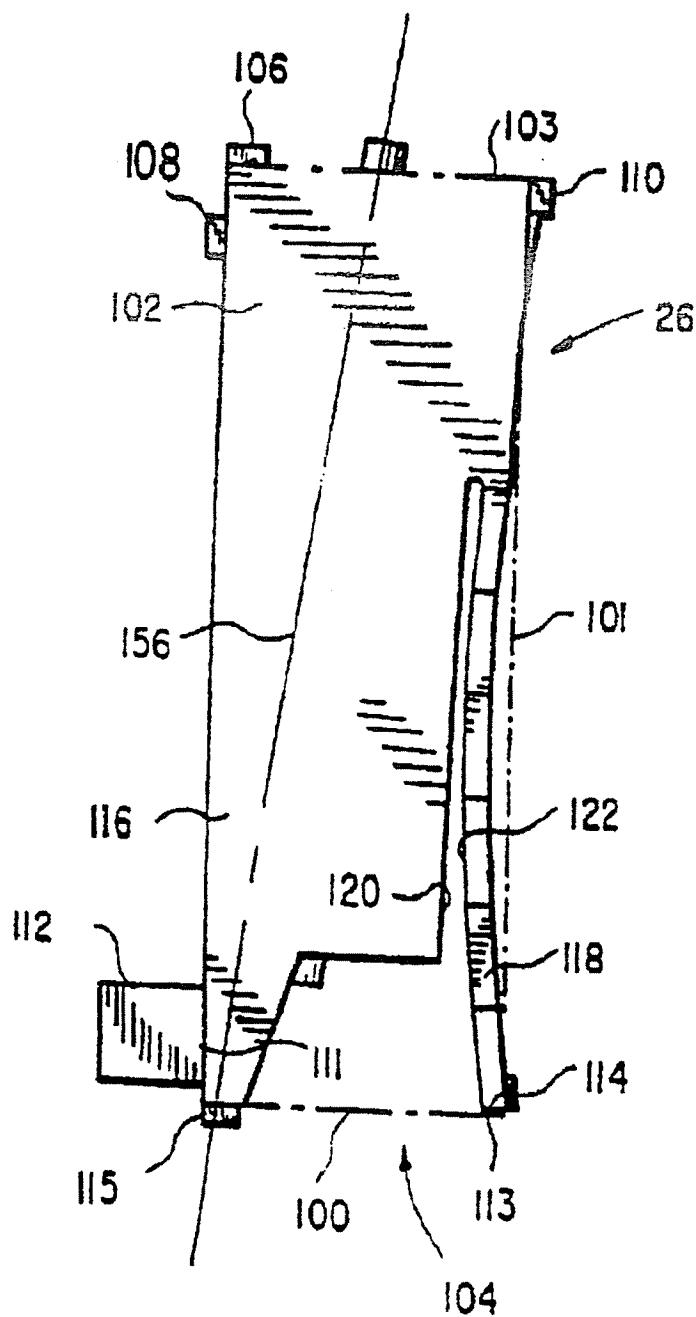


FIG. 5

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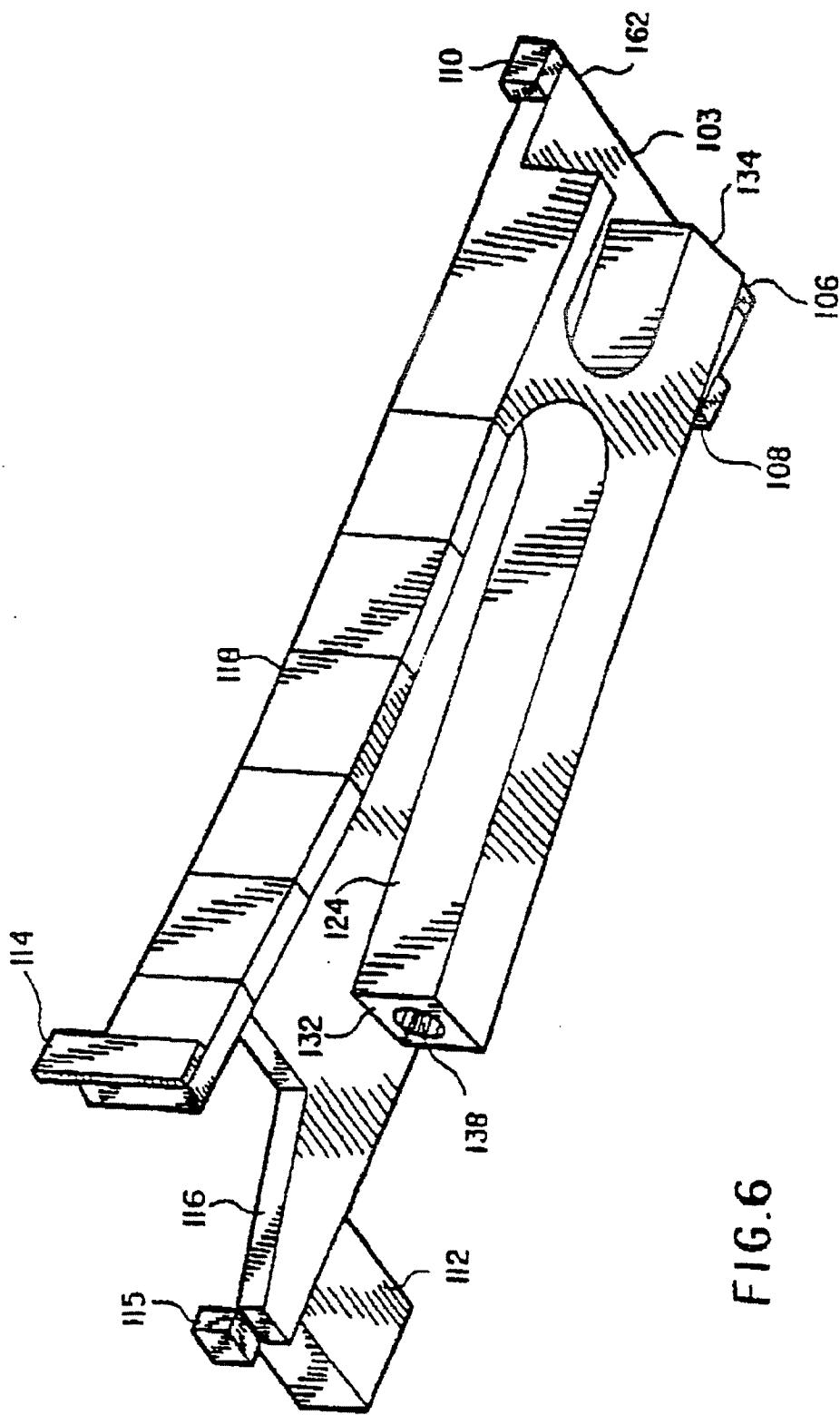


FIG. 6

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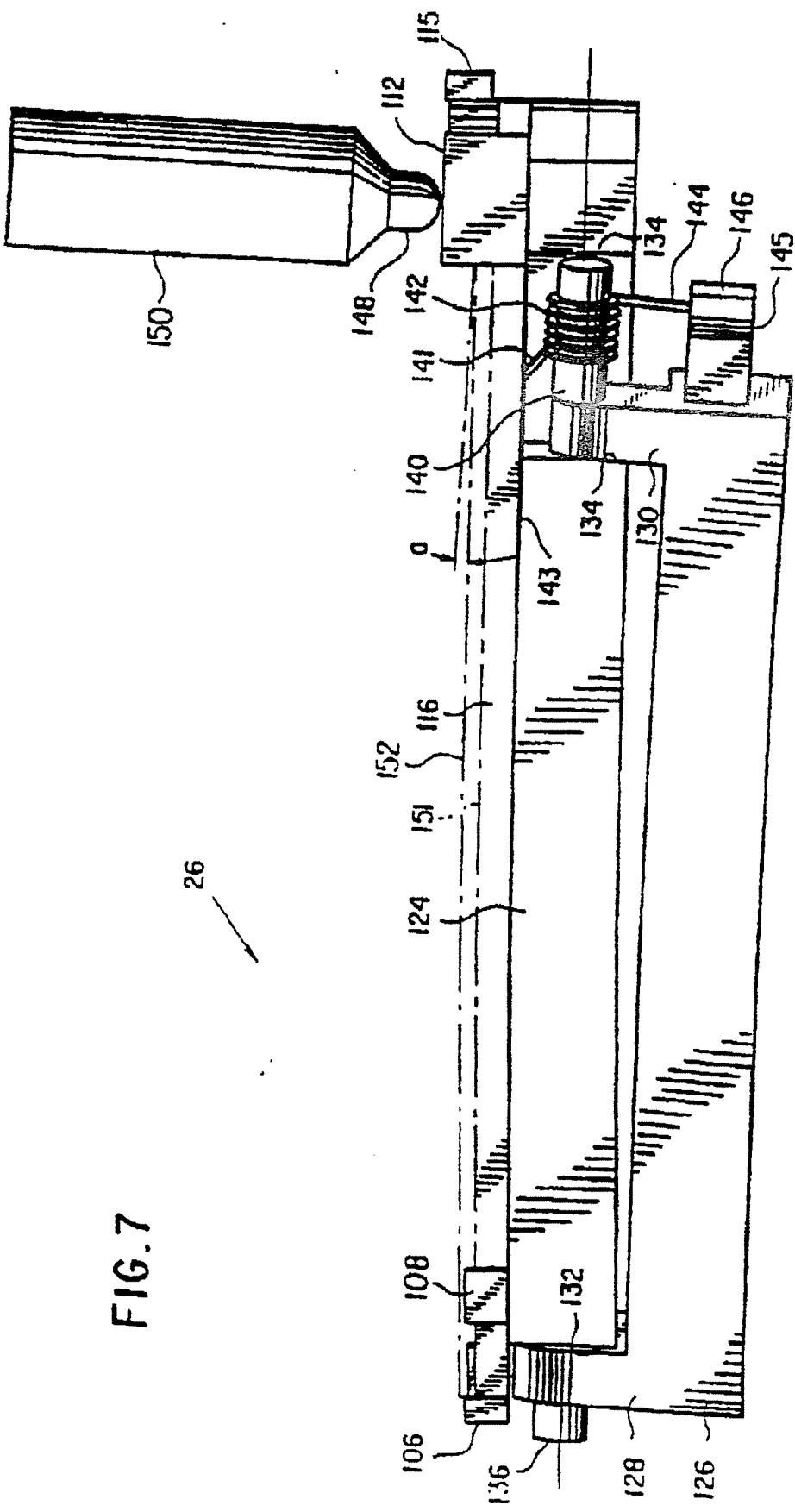


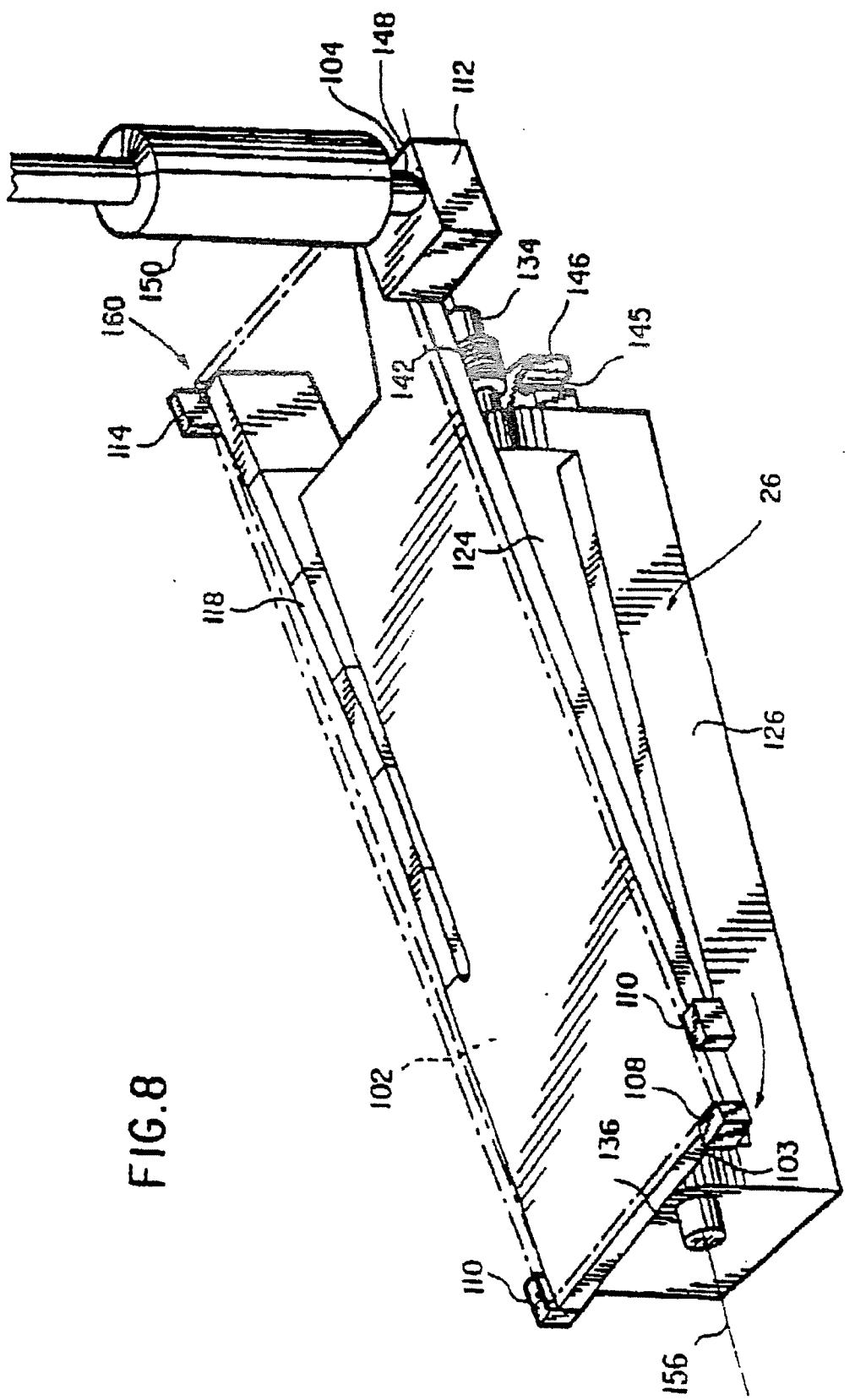
FIG. 7

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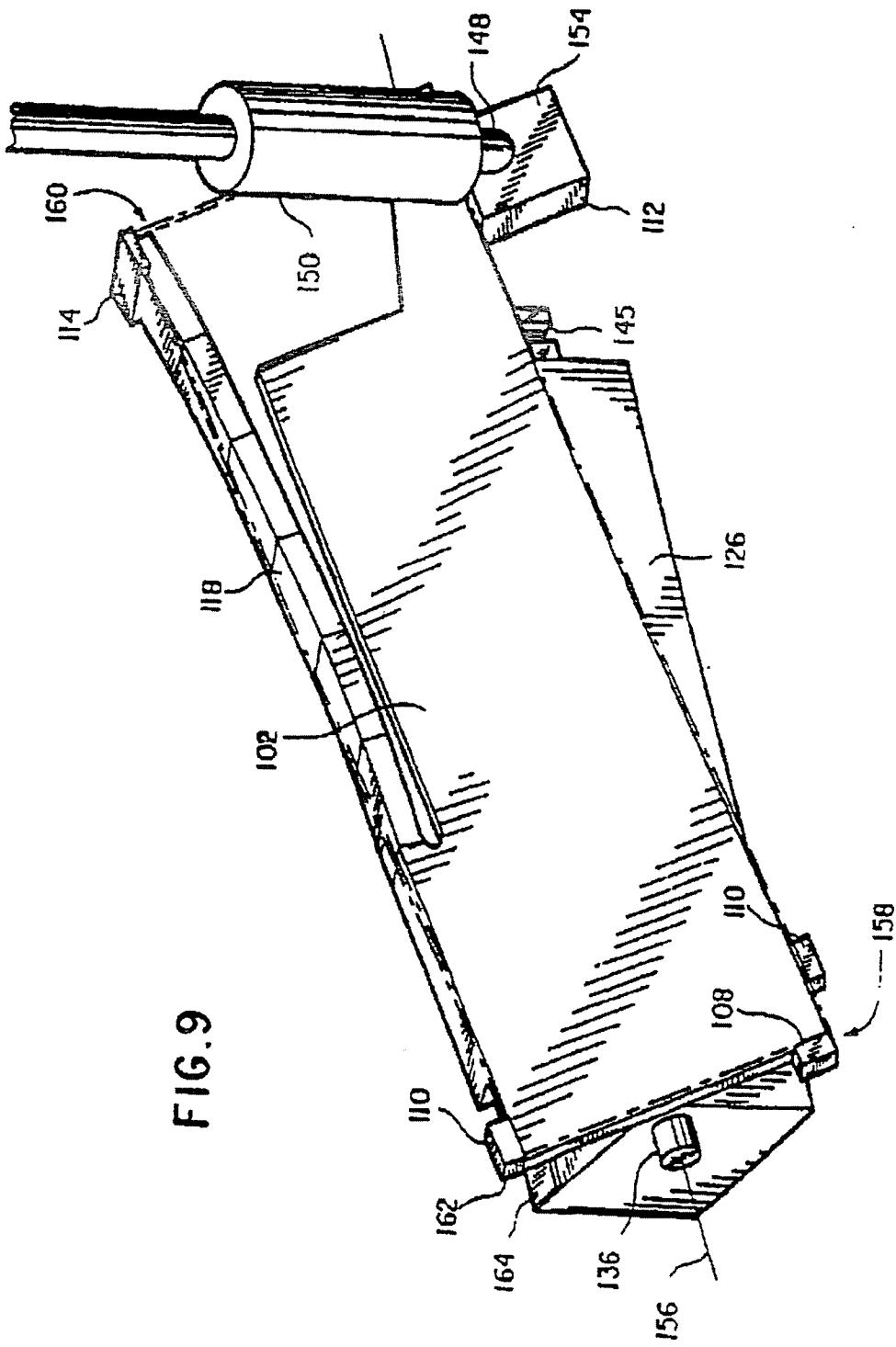


FIG. 9

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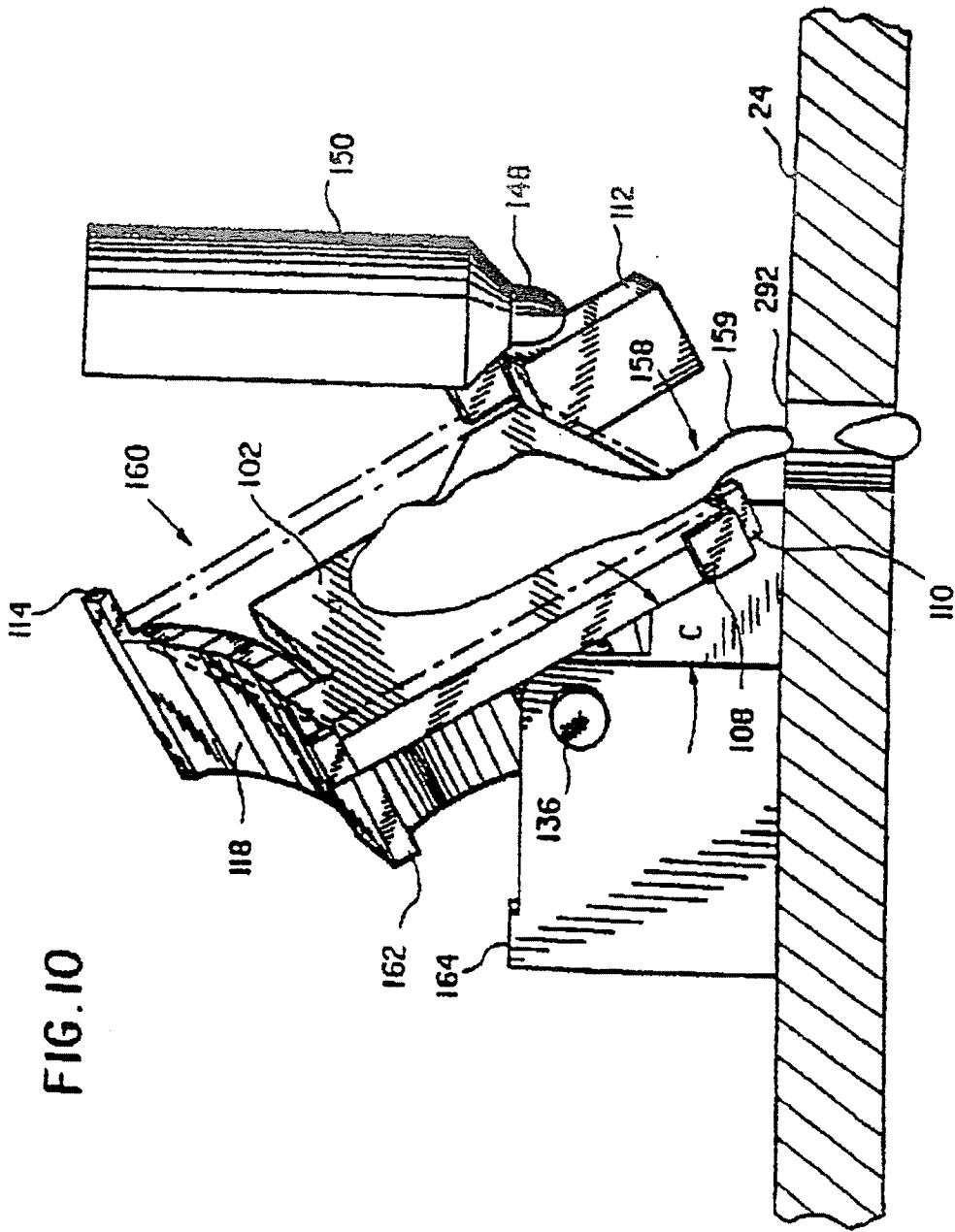


FIG. 10

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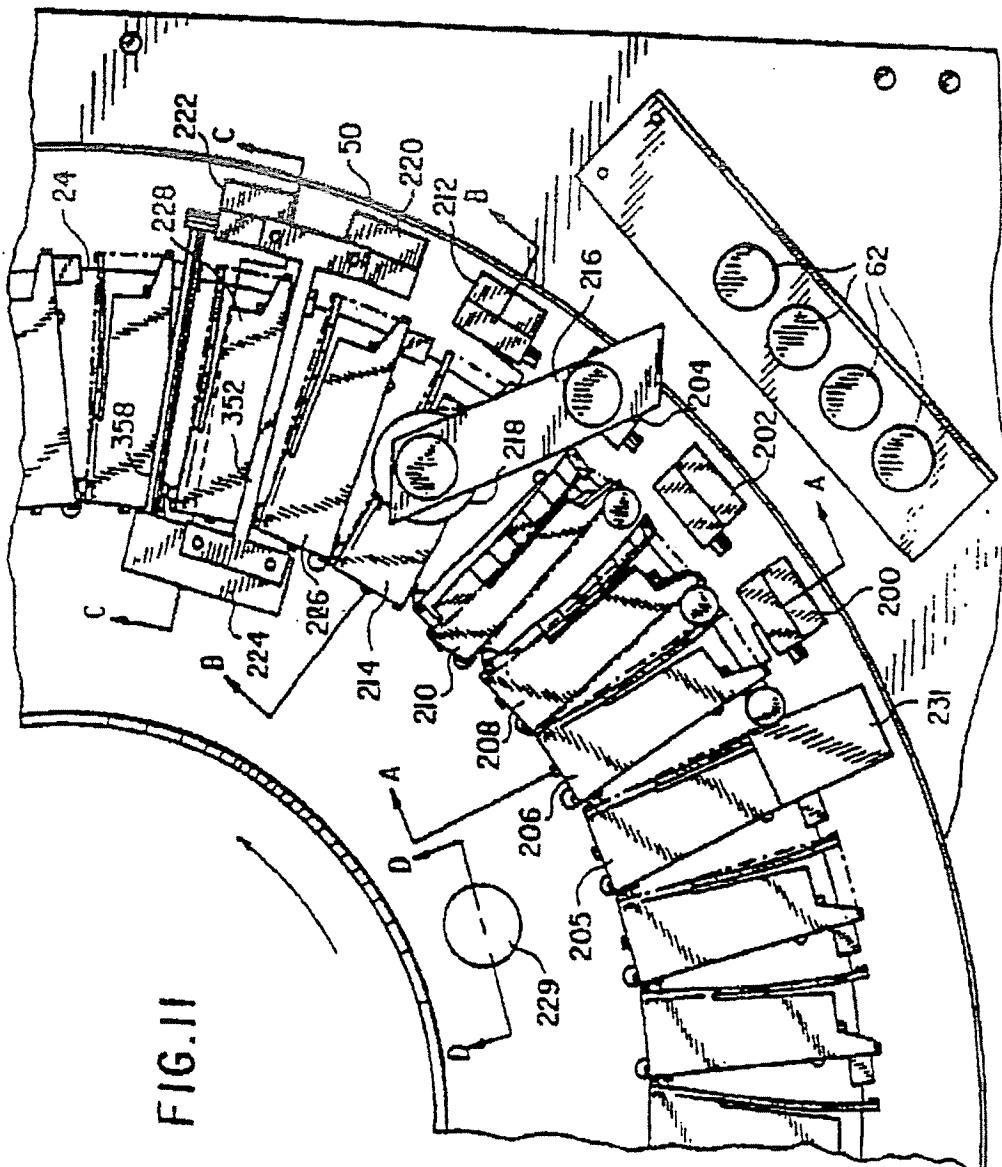


FIG.

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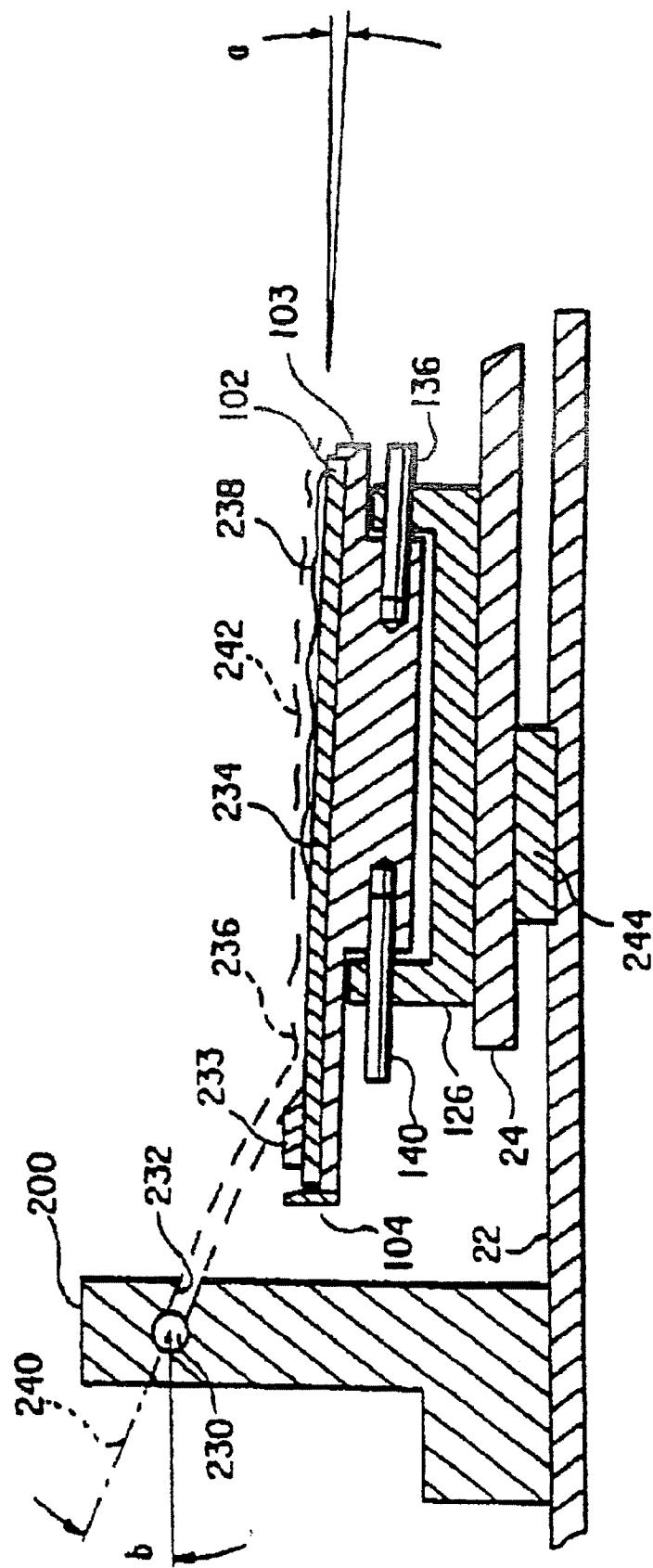


FIG. 12

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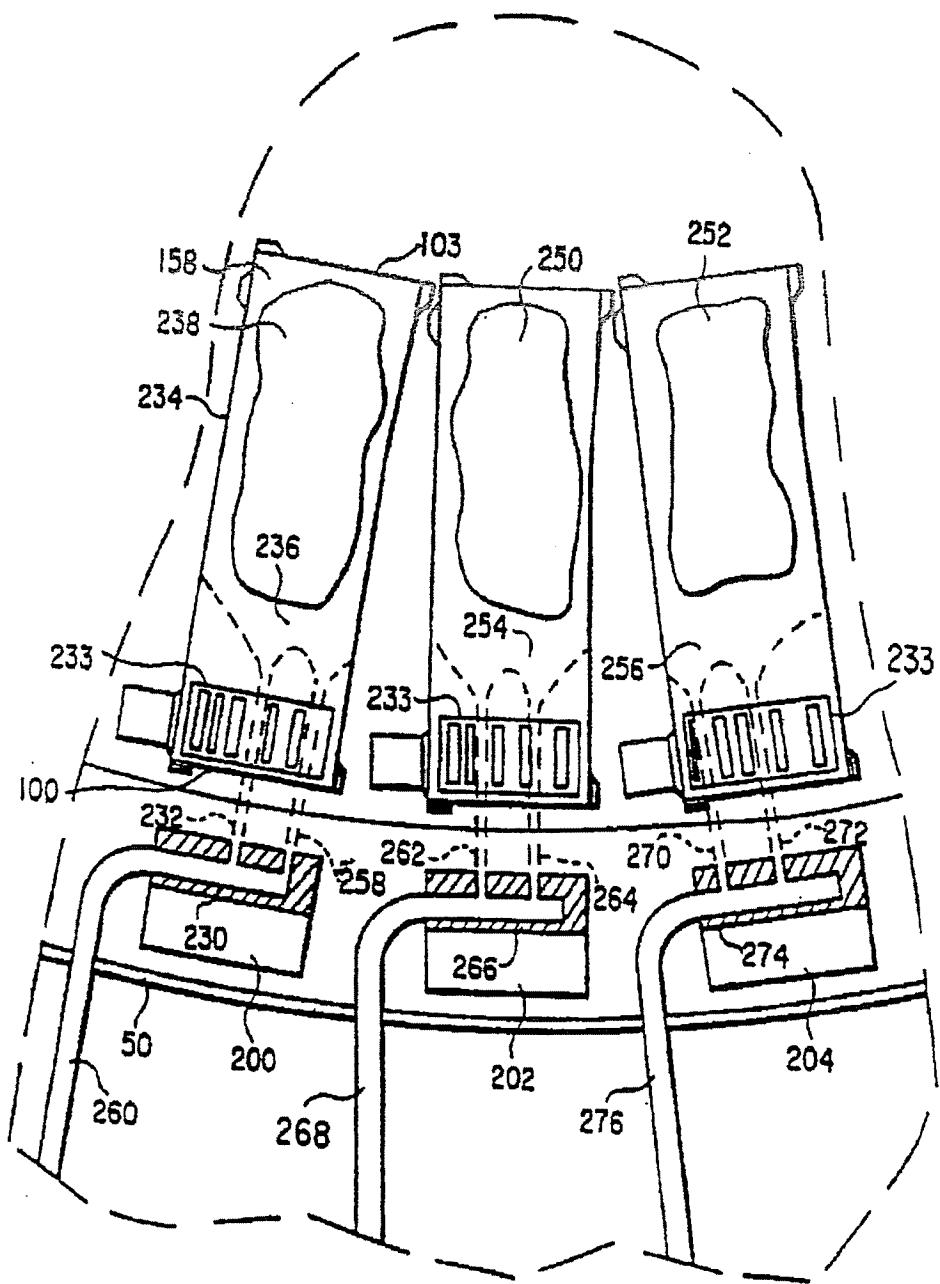


FIG.13

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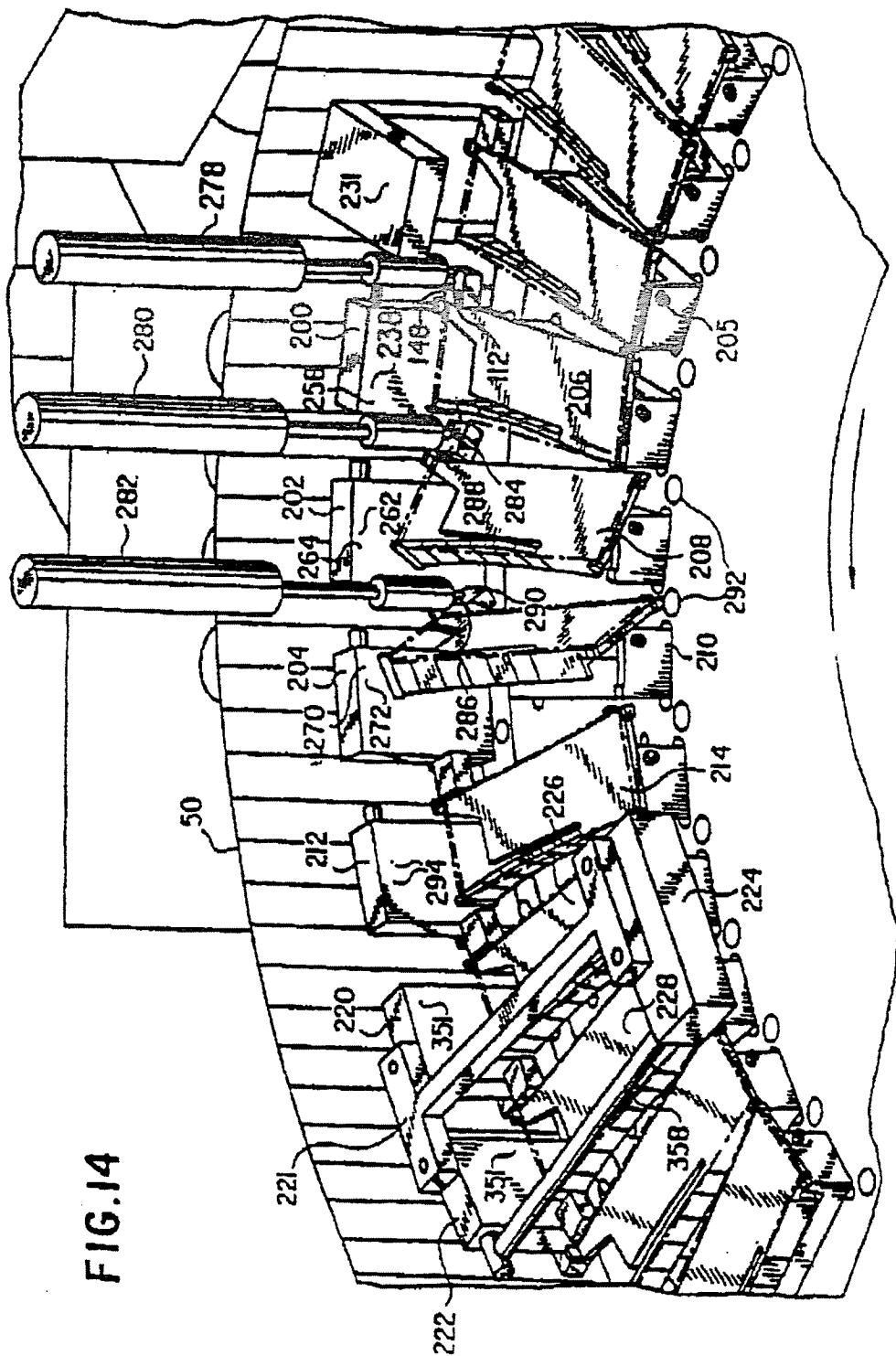


FIG. 14

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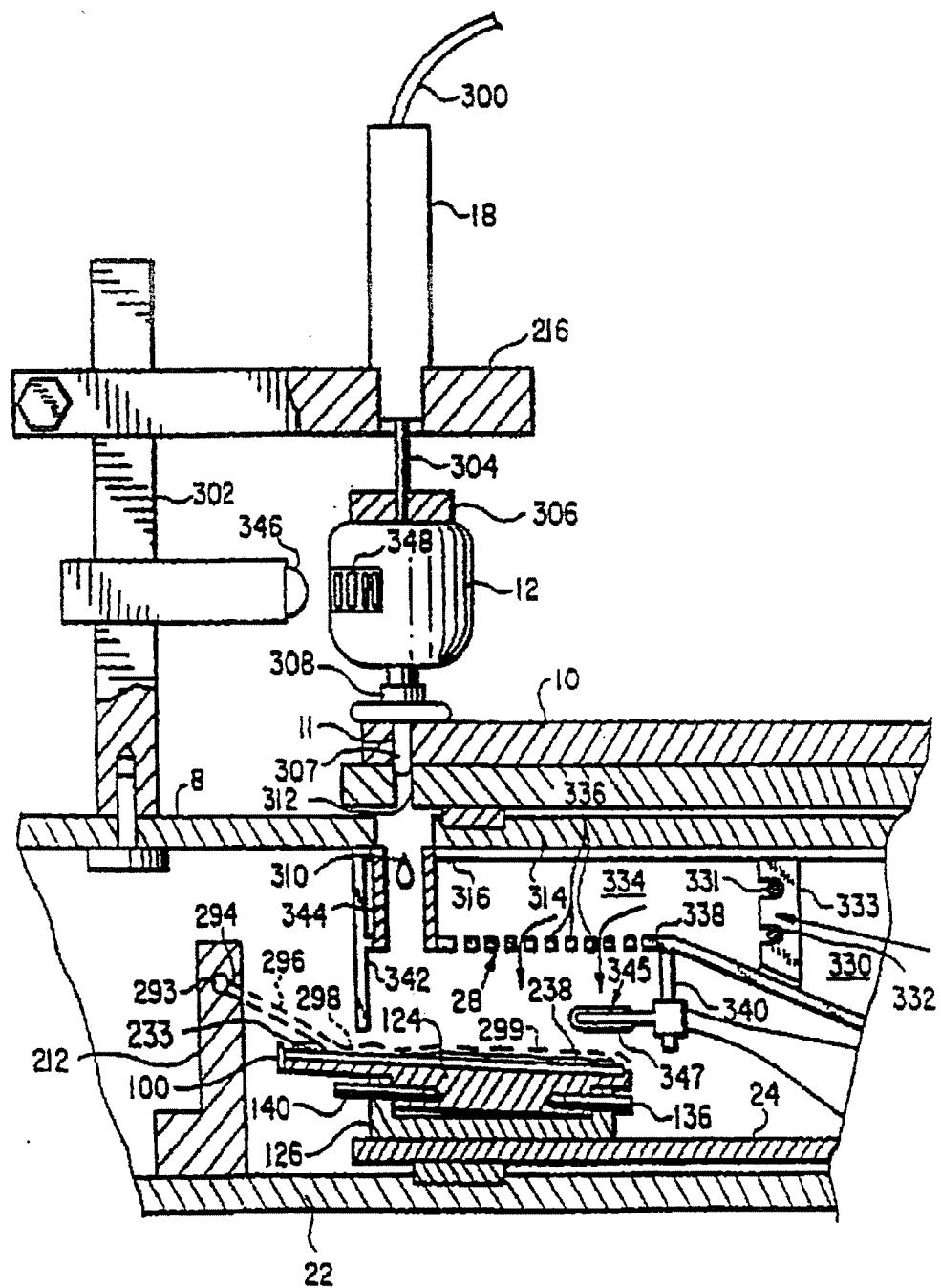


FIG. 15

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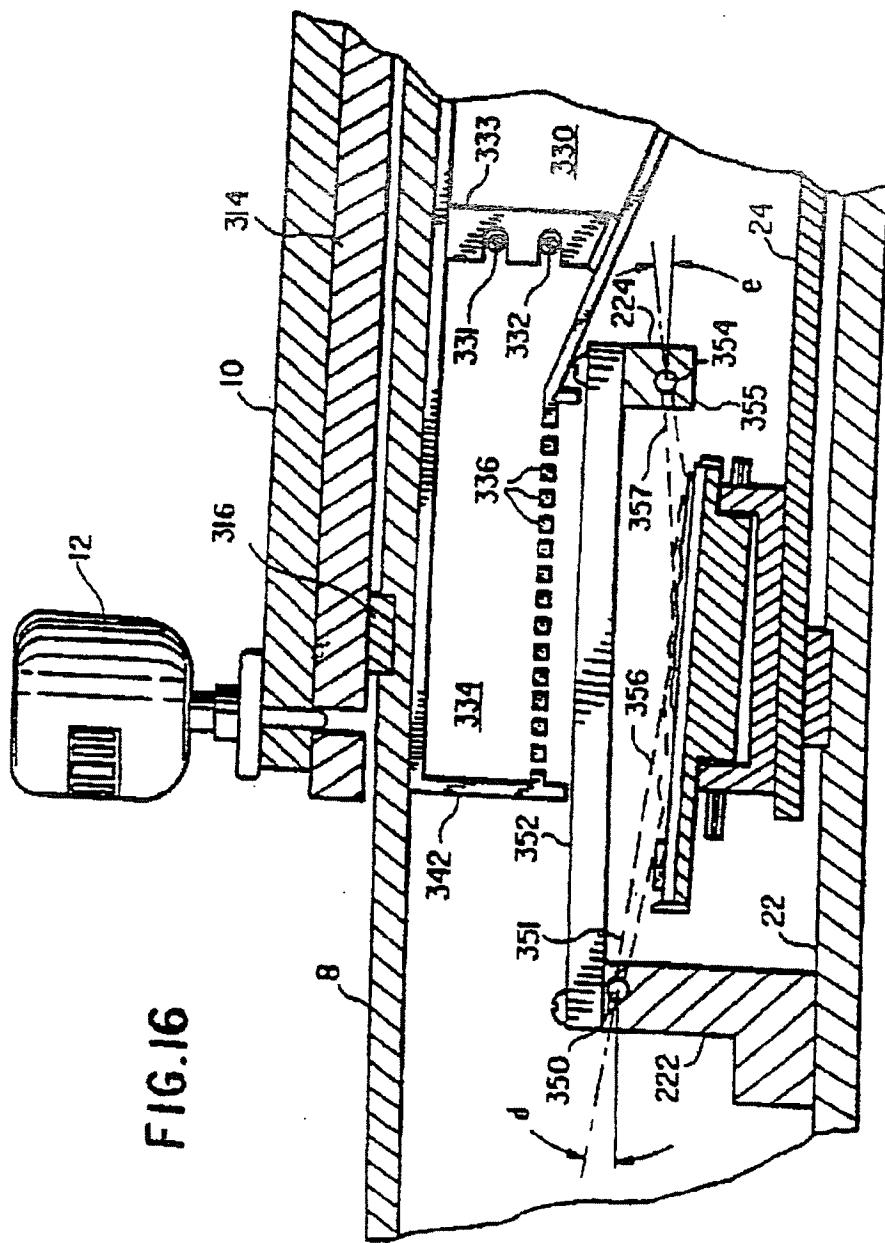


FIG. 16

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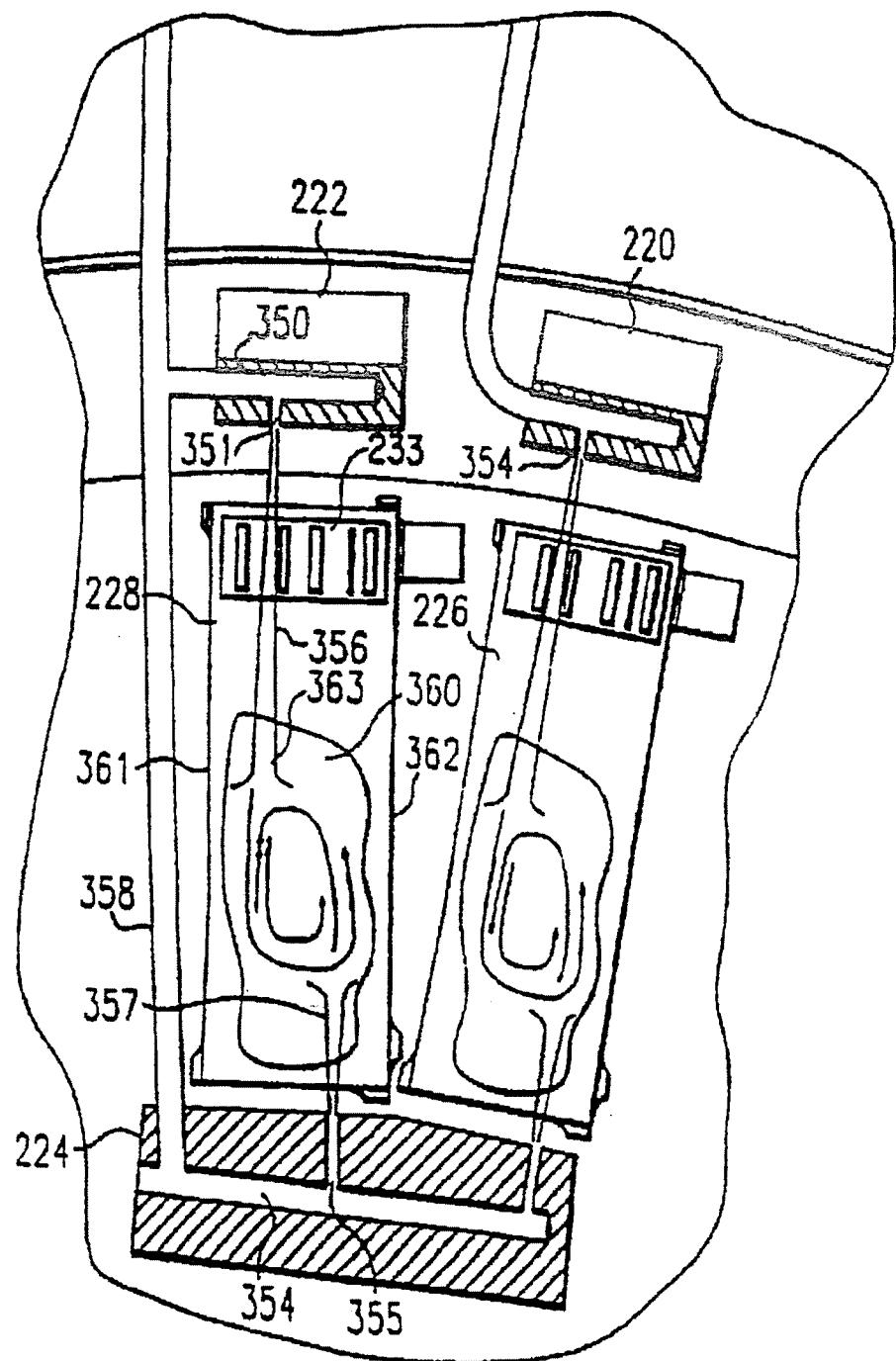


FIG. 17

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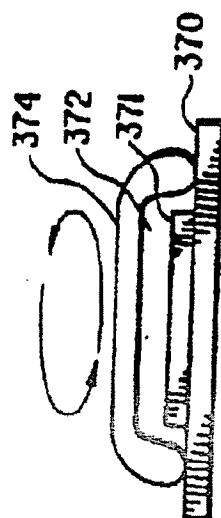


FIG. 18C

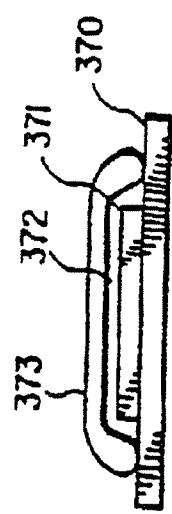


FIG. 18B

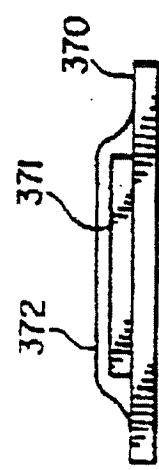


FIG. 18A

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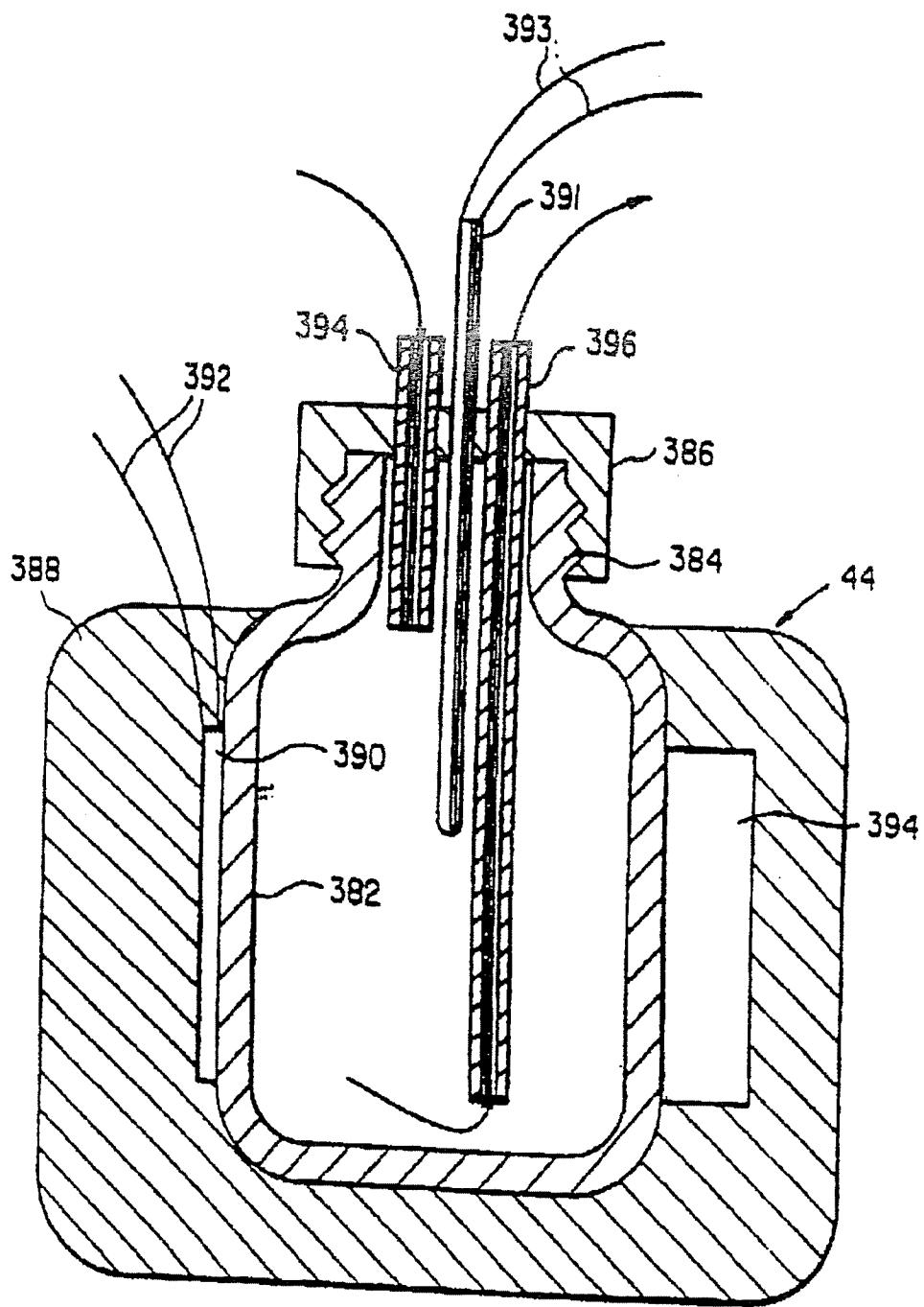


FIG. 19A

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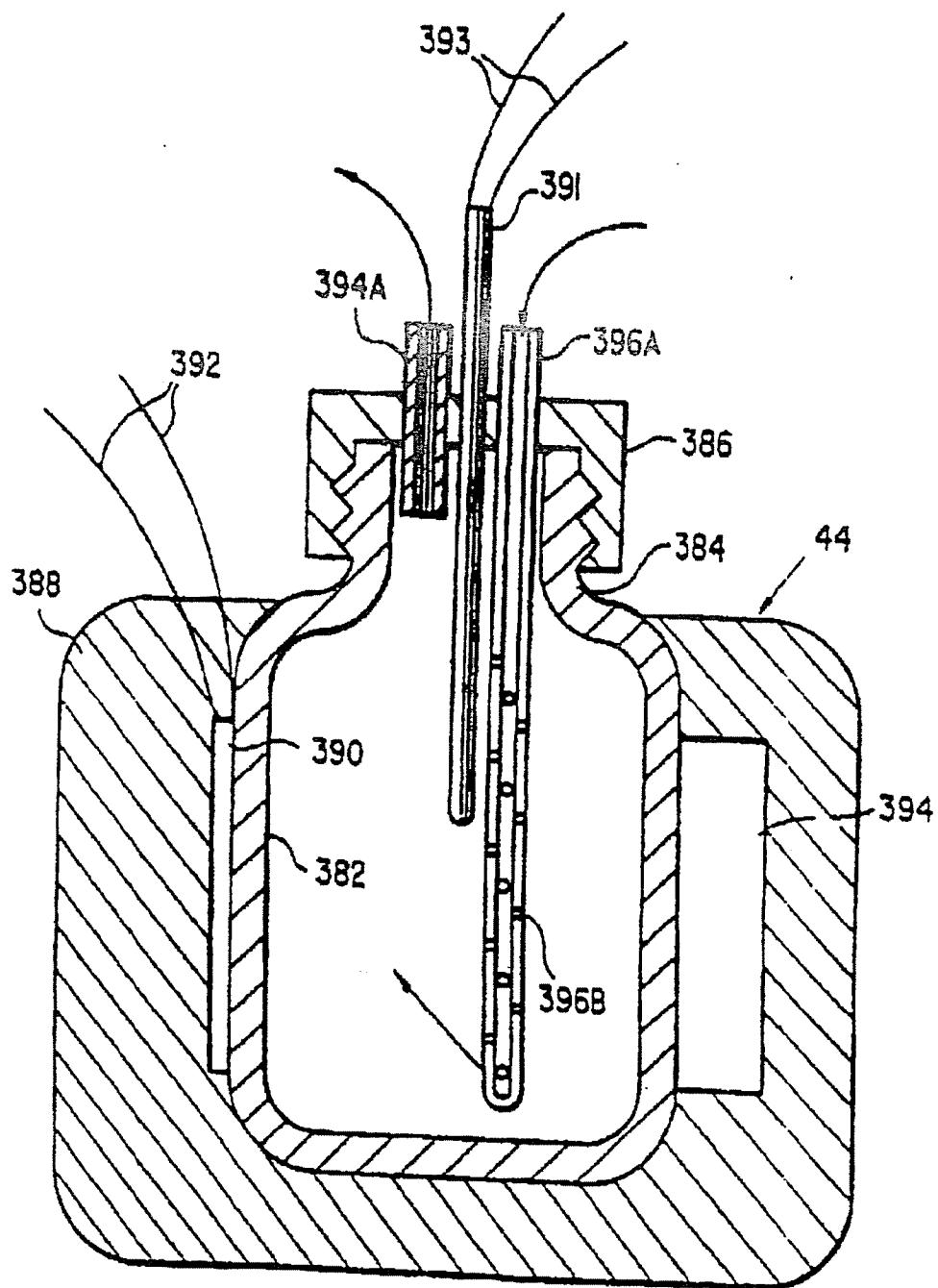


FIG. 19B

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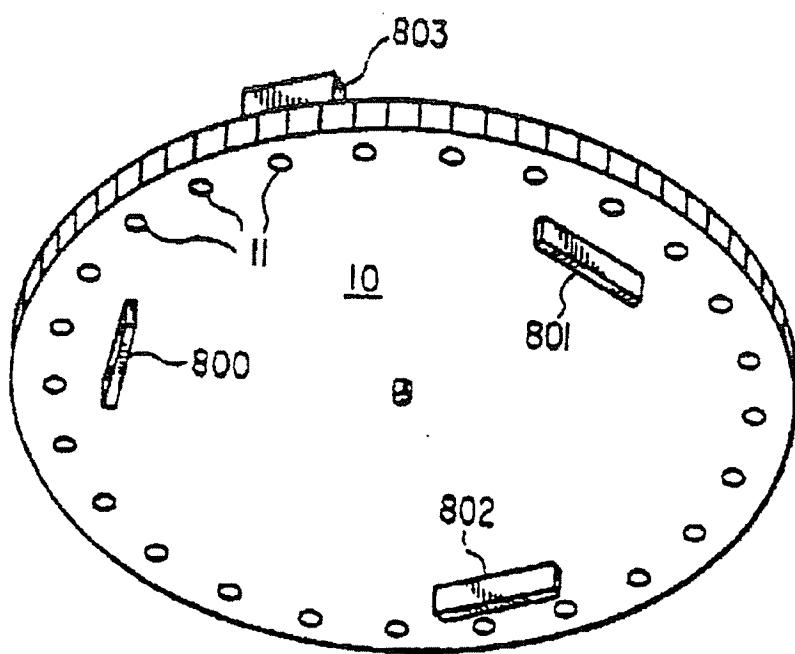


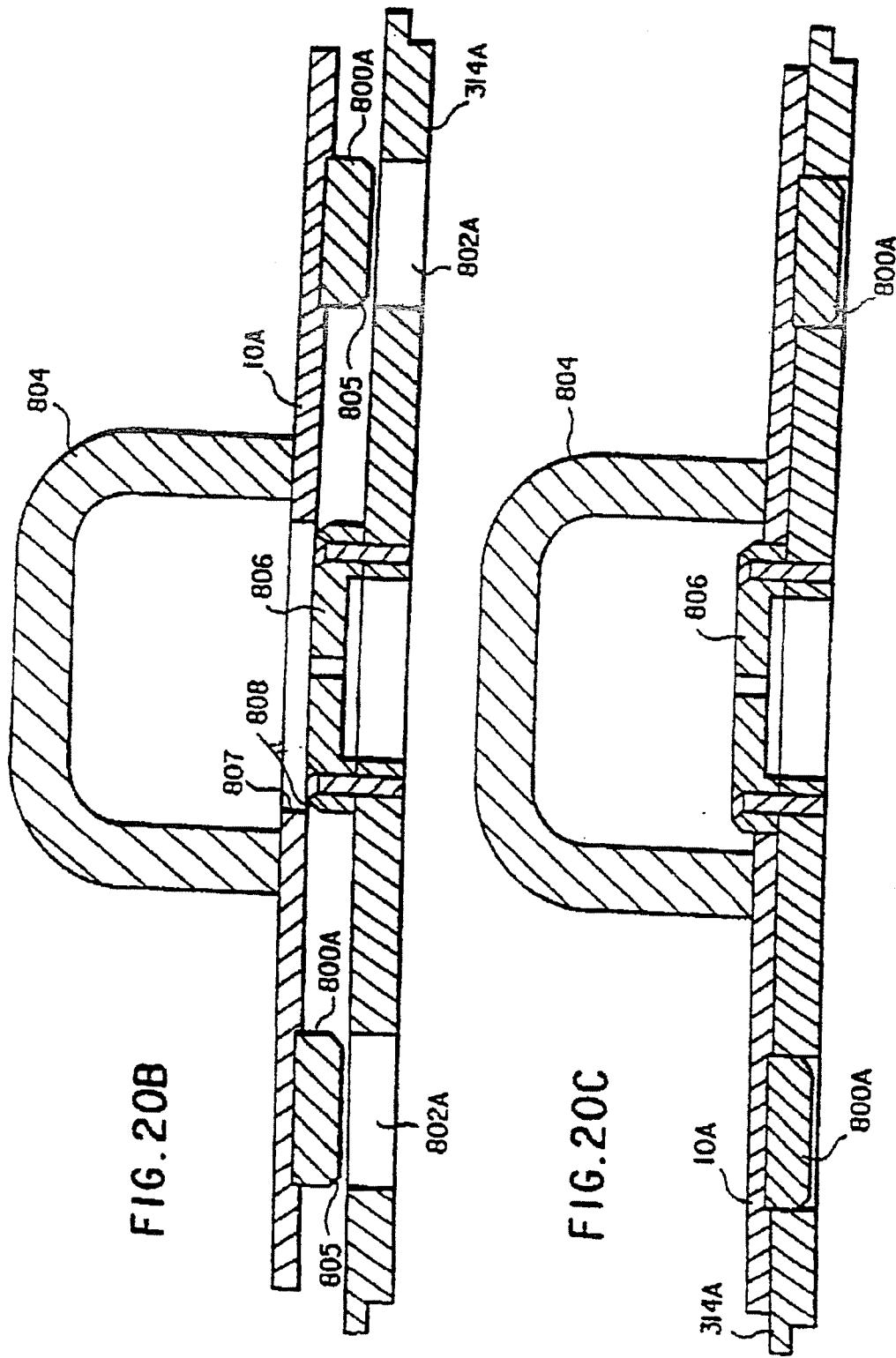
FIG.20A

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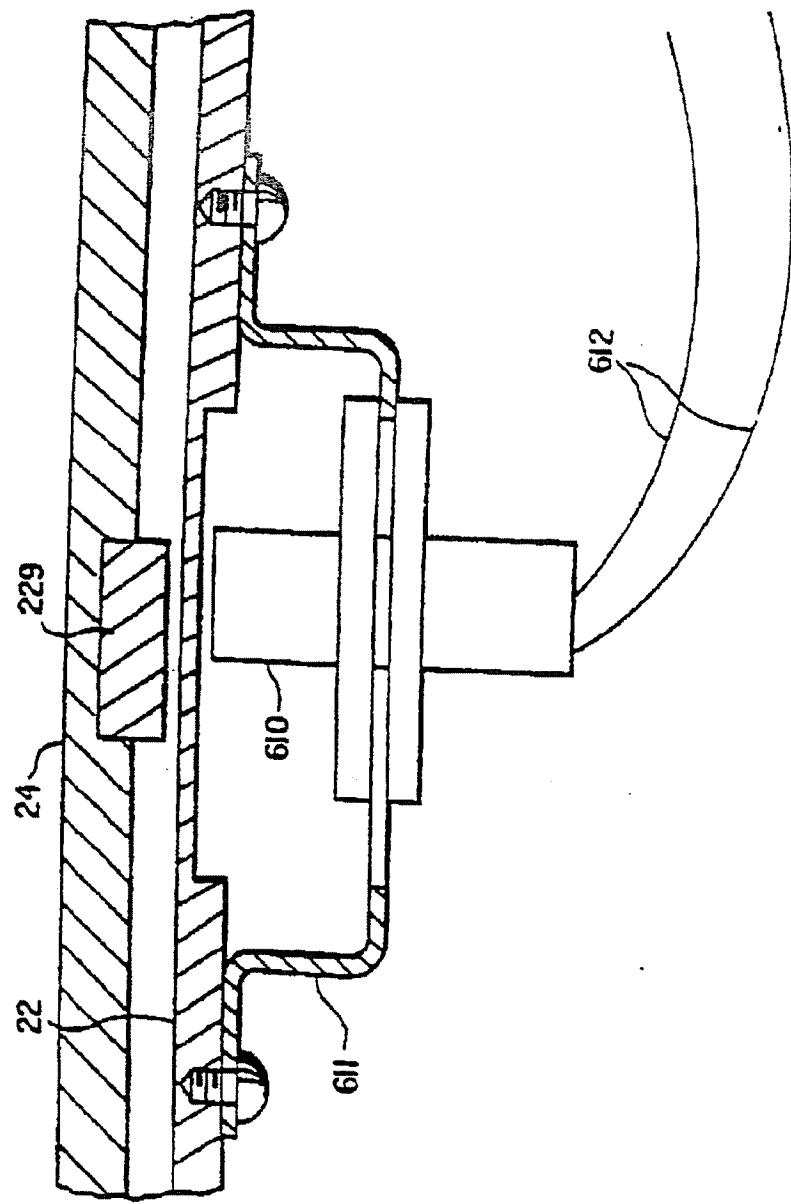
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FIG. 21



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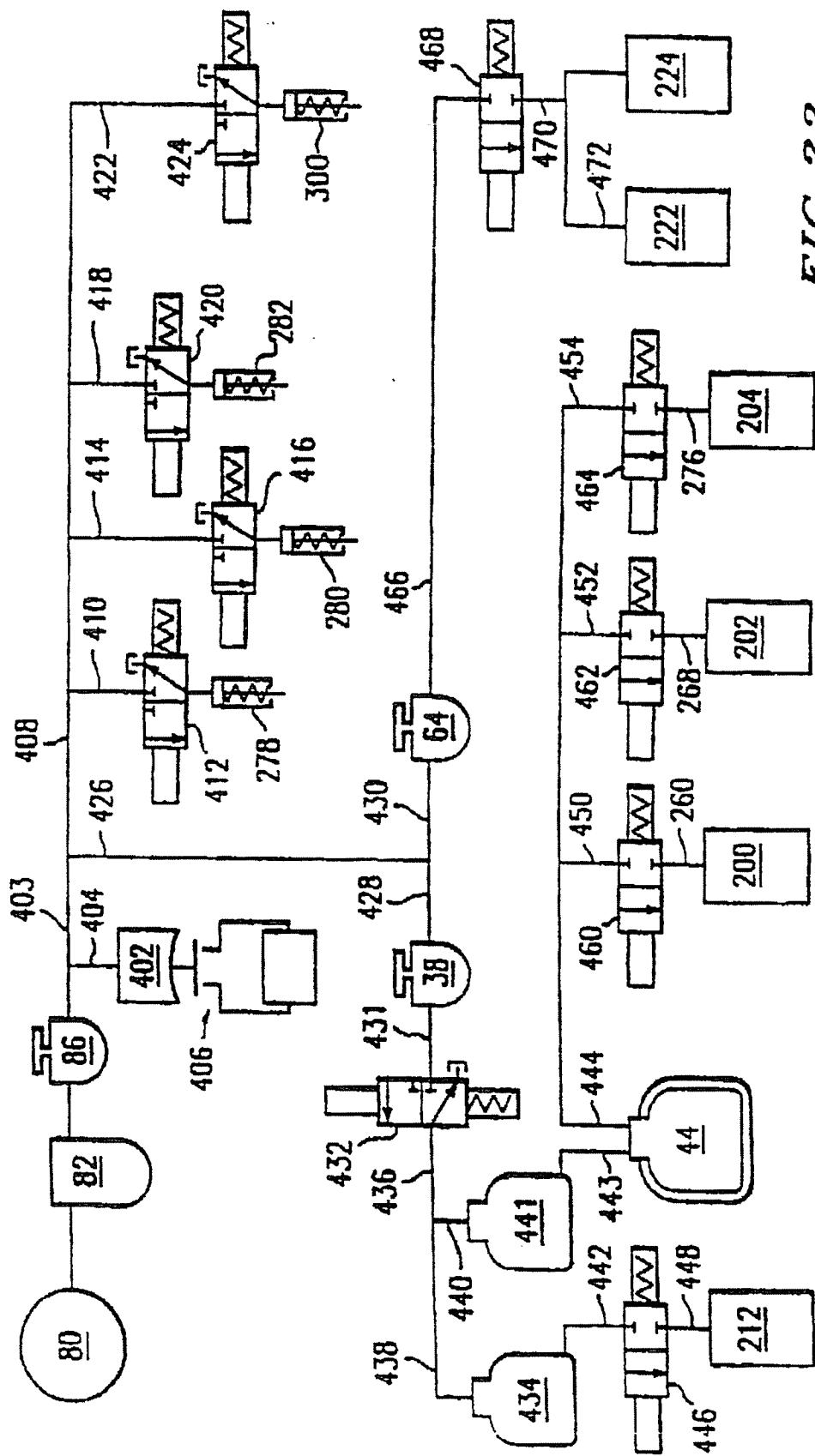


FIG. 22

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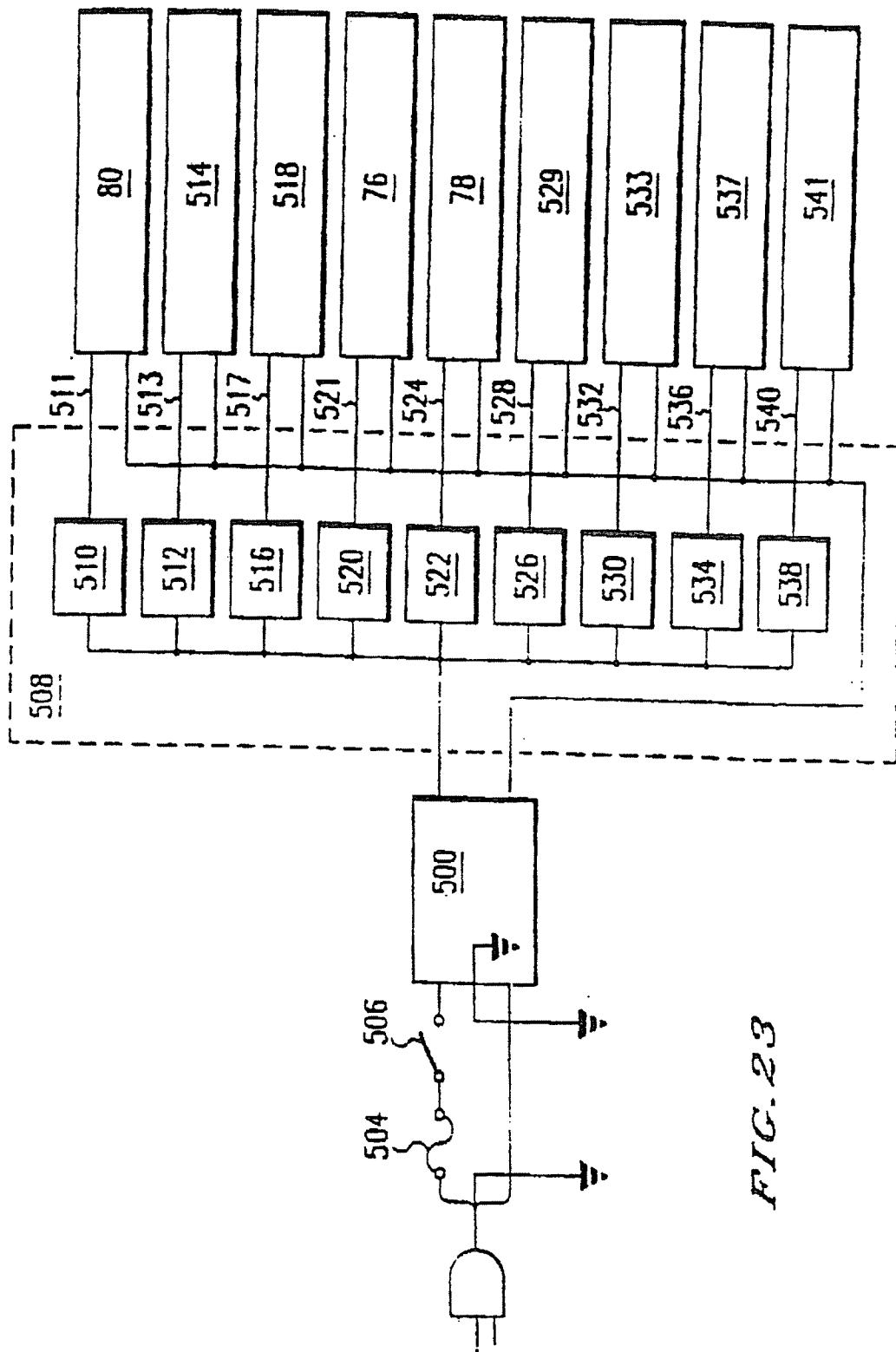


FIG. 23

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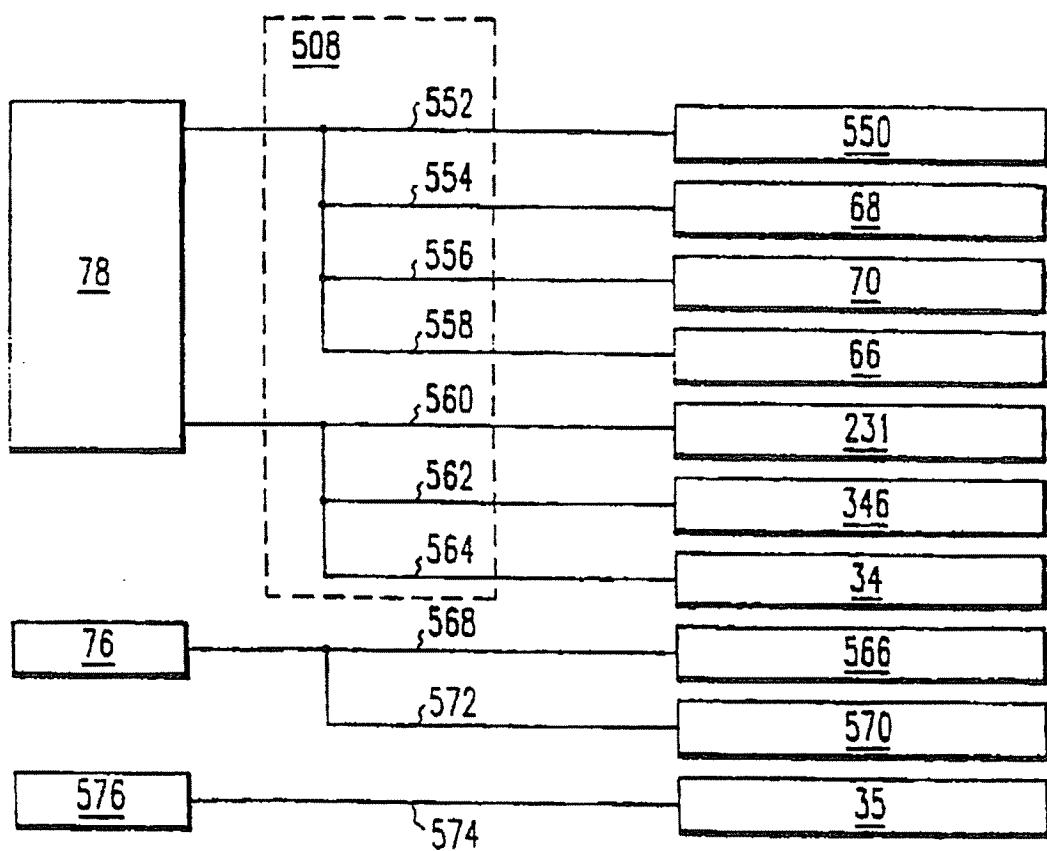


FIG. 24

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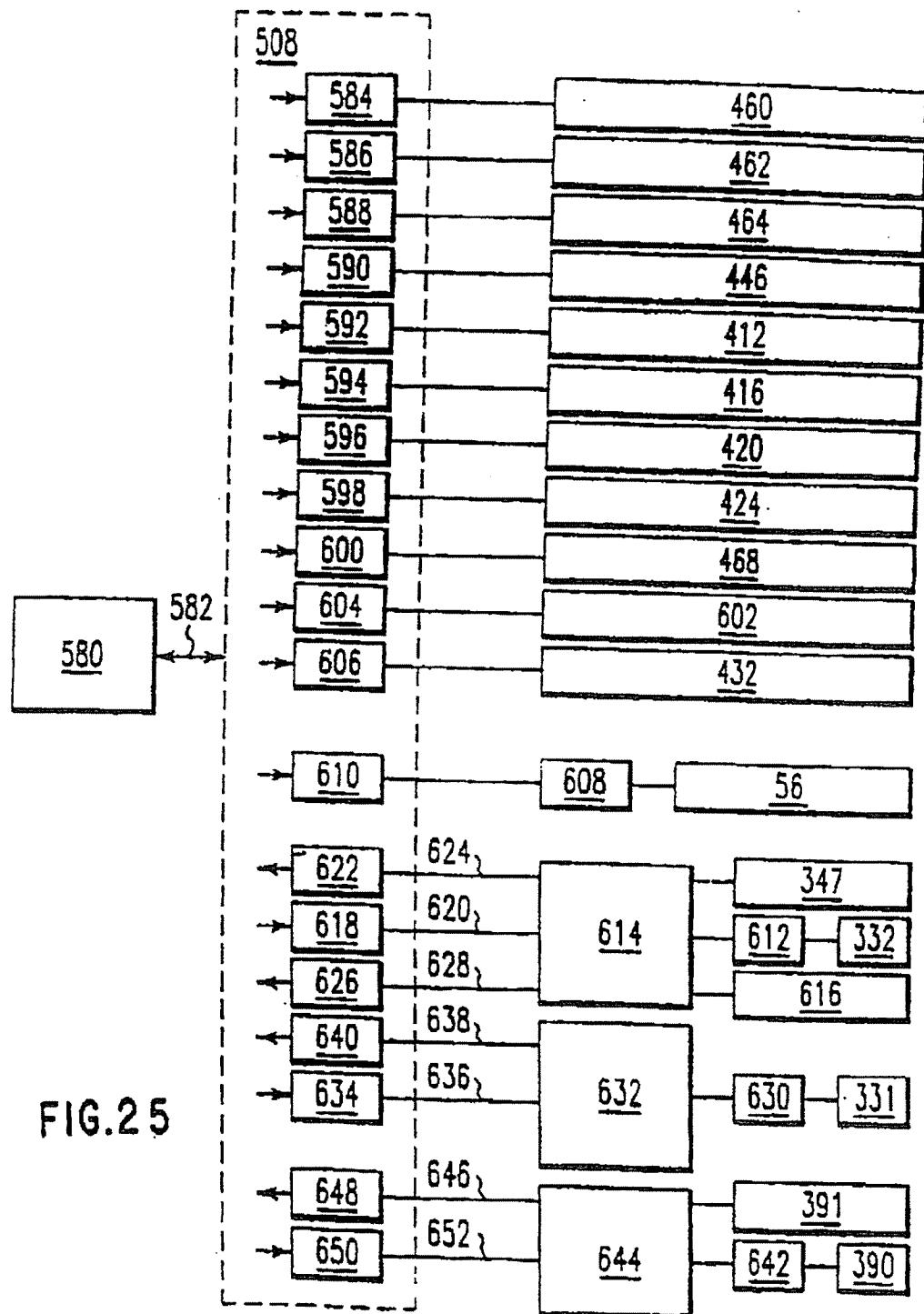


FIG. 25

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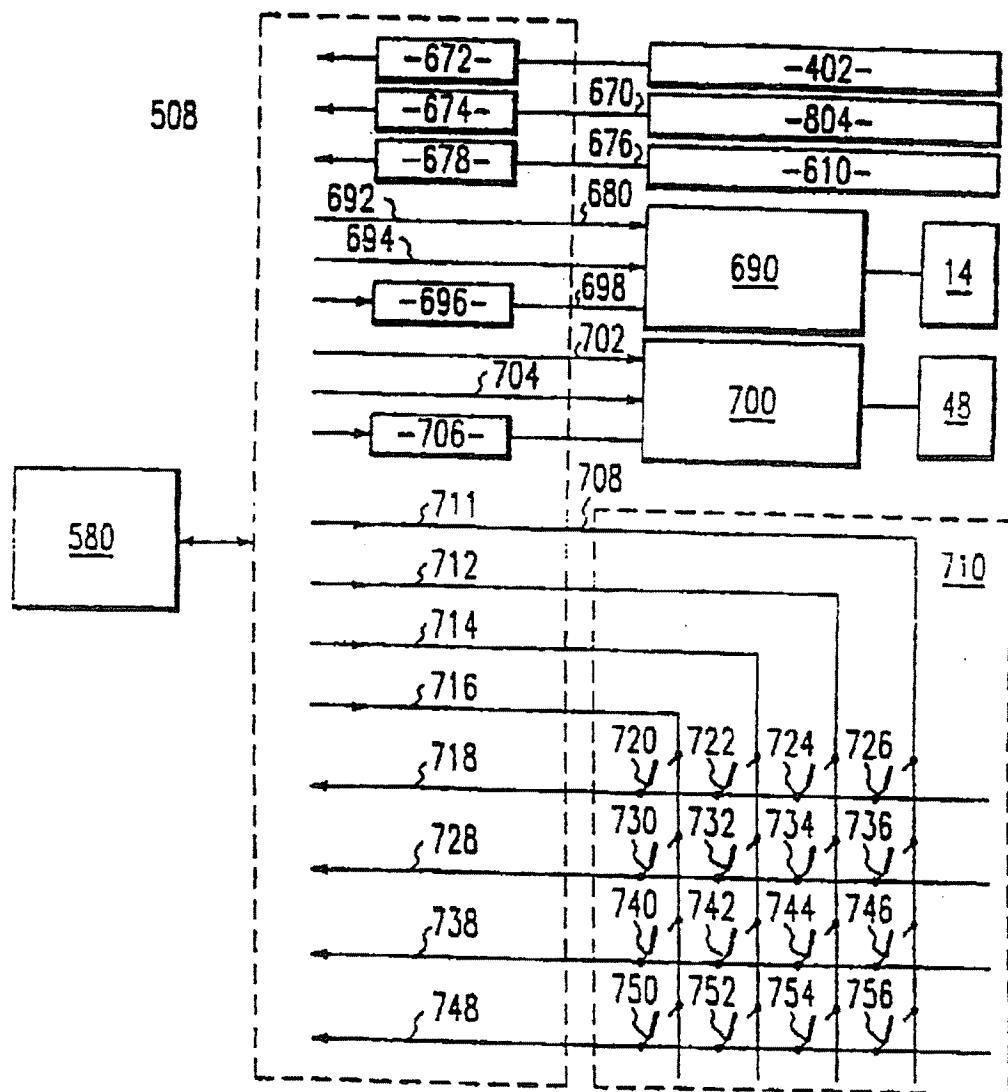


FIG. 26

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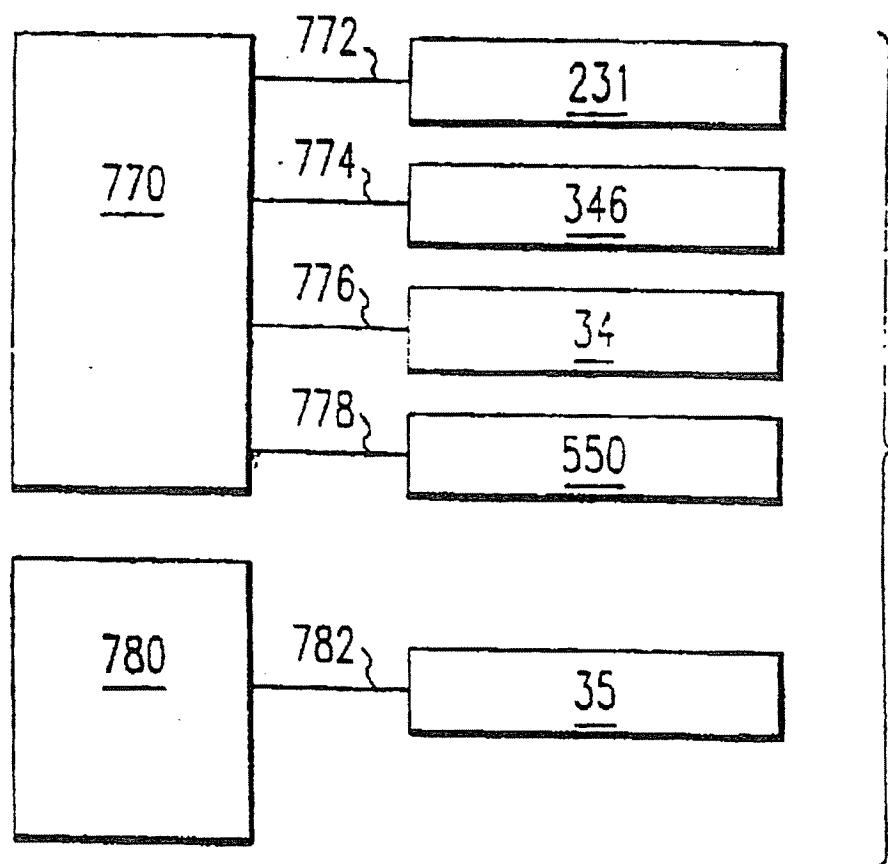


FIG. 27

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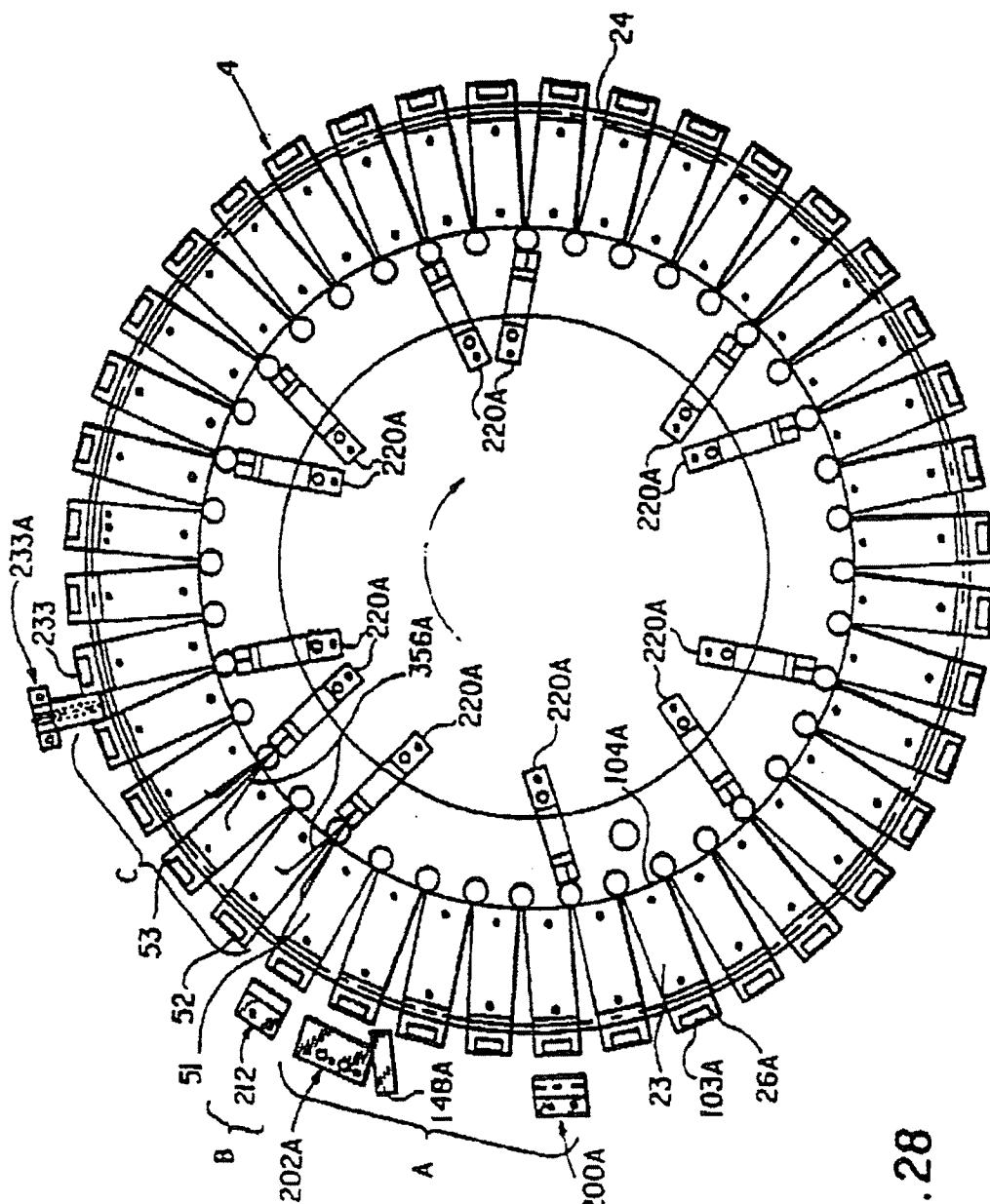


FIG. 28

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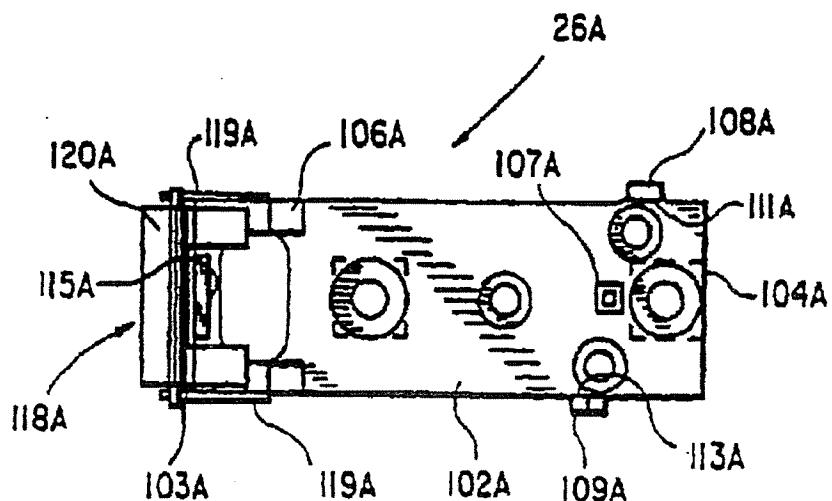


FIG. 29A

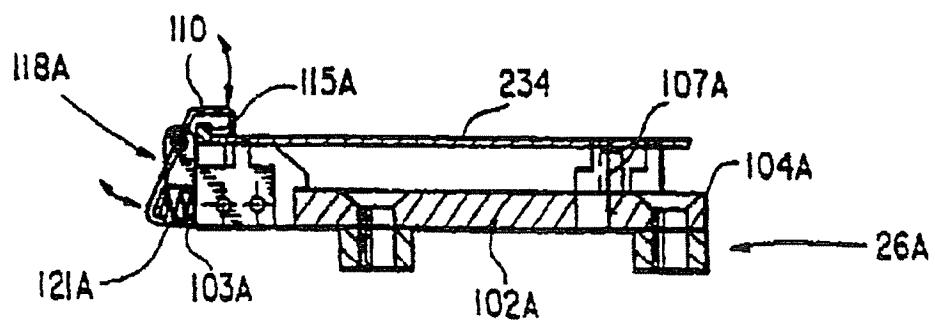


FIG. 29B

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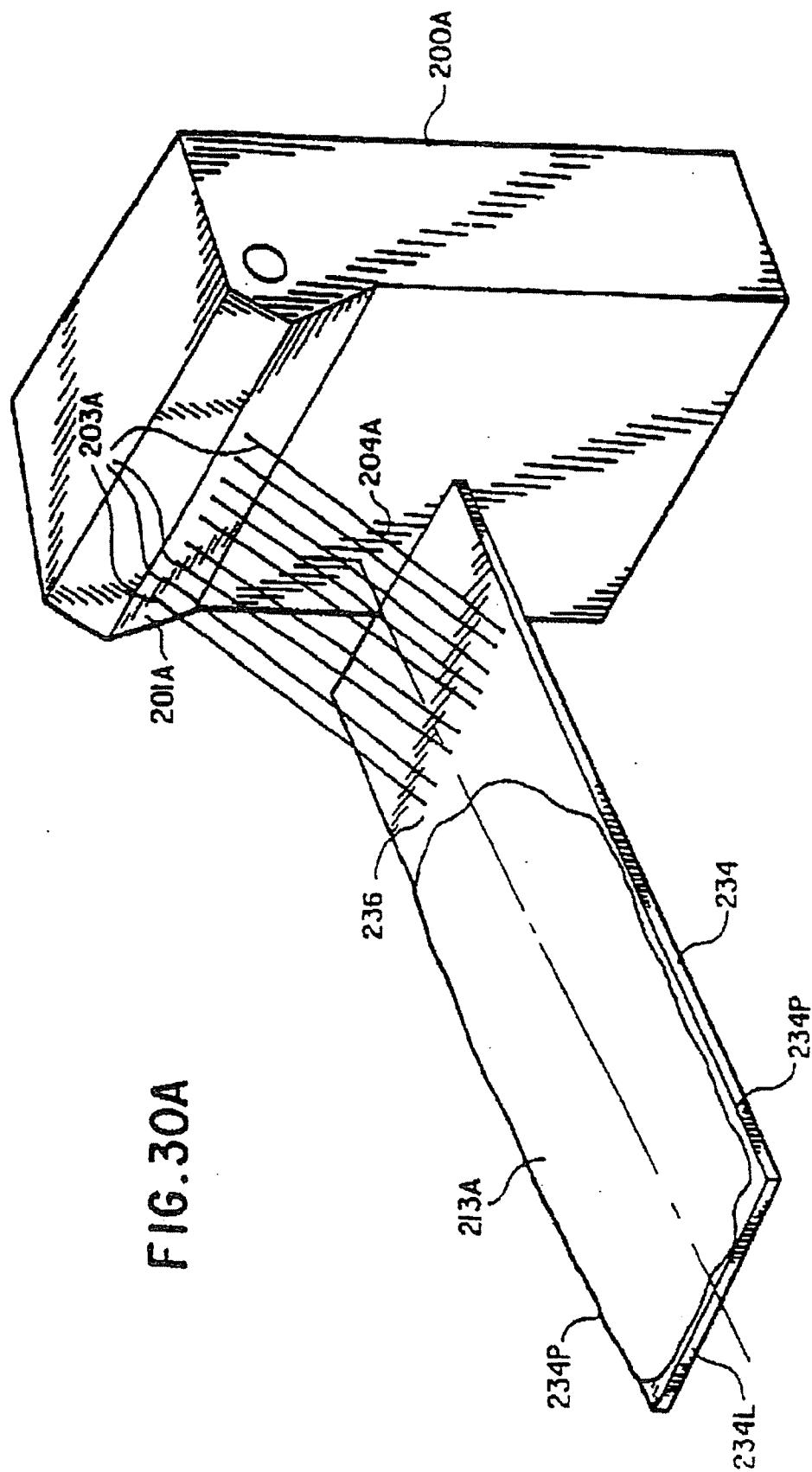


FIG. 30A

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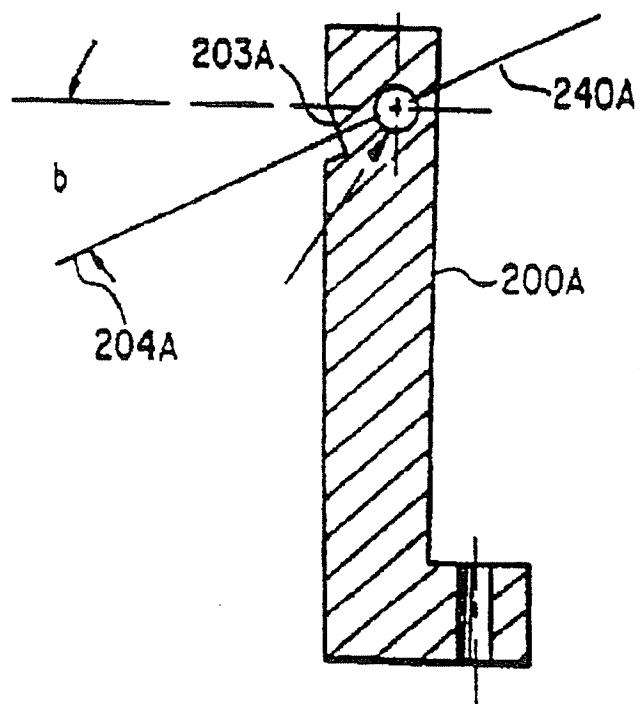


FIG. 30B

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